The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. VII. No. 165 AUGUST 12, 1922 Prepaid Annual Subscription United Kingdom, £1.1.0; Abroad, £1.6.0.

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices—8, *Bouverie St., London, E.C.4.*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines).

English and German Literature

FOLLOWING on Dr. Ruttan's address at Glasgow, we have received numerous letters from chemists who, with one consent, deplore the disparity that prevails between the prices charged for technical books and literature in sterling to the British market and those charged to Germans in Germany. As a rule the average prices are about twenty-five times as great over here. In one case a complete *Berichte* was offered for 100,000 marks; that was when the rate of exchange was 1,280. What the price would be now we do not venture to speculate. Such transactions must be highly profitable to Herr Buchhändler, particularly when they concern pre-war publications; and it is more than obvious that the German publishing *cartel* does not intend chemists of the allied countries to profit by depreciation of the mark. Such a position was only to be expected, but we do not agree with the suggestion of a contemporary that the allied Governments should apply their consideration to the matter. That would probably only entail a repetition of the difficulties which have attended the working of the Safeguarding of Industries Act. In chemical literature, as in dyestuffs, this country has been dependent on Germany for thoroughness and enterprise; but there seems no cogent reason why such a deplorable confession should be perpetuated. We demand from candidates for scientific degrees a knowledge of German sufficient to enable them to translate fairly accurately with or without the aid of a dictionary, and at a rate that is allowed to be, broadly speaking, as slow as the candidate likes so long as it is sufficient for his future needs when referring to original research. But the English student does not habitually think in German, and to read rapidly one has to *think* in a language—not merely translate it into one's mother tongue, and students for honours degrees have certainly not the time laboriously to translate foreign literature.

As a scientific public we are inundated with a plethora of elementary text-books on chemistry; but comprehensive monographs and literature that would vie with the German seem to be as rare as golden sovereigns. What we require at the moment is an English Beilstein, also English equivalents of Meyer and Jacobson, Friedlander, Ullmann and Lassar-Cohn or Weyl. Translations are all very well, but, to look at the matter from another viewpoint, we can hardly imagine a German chemical student being referred to an English treatise for general reading.

It has been urged that science should be above nationalities; but national prestige, national incentive, national enthusiasm, and a comprehensive literature in our mother-tongue, are assets too valuable to be discarded as a gift to another people. The solution of the German literature problem is to be found in a working arrangement between British publishers and British authors. That such a task is not beyond the co-operation of British enterprise on the one part and British patience and careful work on the other will probably be appreciated when our readers have had an opportunity of studying the programme which the publishers of THE CHEMICAL AGE have mapped out in an attempt to give industrial chemists what this country has never previously thought it worth while to give them. One cannot embark lightheartedly on the task of remedying a deficiency which has been obvious for years, but which the scientific purgation of the war made doubly apparent. At the moment we can do no more than whet our readers' interest by disclosing the fact that Benn Brothers' new "Technical Chemical Series" of volumes (which is already in the hands of authors whose names are household words in scientific circles in this country) should go a long way towards establishing our technical literature on a sound basis and eliminating that constant necessity for relying upon foreign authorities for the most trustworthy information. At a later

date we shall hope to return to this subject, and give an indication of the comprehensive field which this novel series will cover.

Research on Adhesives

In the manufacture of glue and other adhesives there are very wide variations in the processes employed by different firms and in the character of their finished products. It would seem, indeed, from the first Report of the Adhesives Research Committee (H.M. Stationery Office, 4s.) that with few exceptions the manufacturing processes employed in this country are purely empirical and without any real scientific basis. The Committee, in expressing the hope that their investigations will be of assistance in the evolution of a sound technology of glue manufacture, draw attention to the existing prejudice, perhaps not altogether unwarranted by experience in the past, against adhesives, other than the common gums, derived from vegetable sources. That valuable adhesives can be obtainable from such sources is regarded as by no means improbable, and this expectation is strengthened by the results which have so far been obtained.

Formed in 1918, the Adhesives Committee, in view of the urgency of the needs of the moment, originally confined its activities to the conservation of existing supplies of raw materials for adhesives and cements, devising improved and more economical methods of manufacture, and the discovery, if possible, of new sources of supply. At the outset, the four following lines of inquiry were adopted:—(*a*) An attempt to evolve physical and mechanical glue tests (to supplement those of the Aircraft Inspection Department whose immediate object was to enable bad glues to be condemned) such as would differentiate between samples of tolerable merit. In this way it was hoped to obtain a closer knowledge of the characteristics of good adhesives, cements and glues for wood. (*b*) To ascertain to what substance or substances, and to what properties of such substances, the adhesive strength of the gelatin base glues is due. (*c*) To discover whether and where wastage of raw material occurred in the course of the existing manufacturing processes, and if so, to suggest a remedy. (*d*) To examine from the point of view of their adhesive power, the physical properties of substances obtainable from sources other than bone, hide or casein, and if possible from waste products of which supplies existed in this country.

For several months the work of the Committee proceeded along these lines and a number of useful results which were obtained are described in the Report, extracts from which are given on another page. Upon the cessation of hostilities, however, the more empirical inquiries which had been undertaken were no longer of the same premier importance, and it became possible for the attention of the Committee to be directed to more fundamental problems, on the solution of which real advance in the knowledge and use of adhesives depends. The experience already gained had shown that the need for a systematic investigation of the general problems of adhesives was very great and the results and experience already obtained gave hope of success. The question of finance, however, threatened to put a stop to any further work. By June, 1919, the sum of money placed at the disposal of the Committee by the Ministry of Munitions was practically exhausted, and the Ministry did not repeat the grant. In May of that year the Committee consequently requested the Department of Scientific and Industrial Research to assist in the continuation of the work. It was hoped that researches of the kind contemplated would be financed, in part at least, by contributions from industrial firms, and that it would be possible to form a Research Association with this end in view. An examination of the position by the Department, however, showed that this was, for a time at least, impossible. The Advisory Council of the Department recognised, however, the scientific and industrial value of investigations such as were contemplated, and it was decided to make arrangements for the continuation of the work. The investigations of the Committee were taken over by the Department, and a new small commitee—the Adhesives Research Committee—was appointed to direct the work. This arrangement had the advantage that, in the event of it being found possible subsequently to form an Adhesives Research Association, the transfer of the investigations and accumulated results would be a comparatively simple matter.

The new Committee has continued certain of the investigations initiated by the original Committee, and, in addition, has undertaken fresh researches of a more fundamental character. Thus considerable progress has been made in the development of vegetable adhesives and in their industrial applications. Much work has also been done upon the chemistry of gelatin and gelatin glues, and, in particular, an attempt has been made to discover the nature of the changes occurring during the formation of gelatin from its precursors in animal tissues.

During their investigations the Committee have been struck by the fact that there is still no generally acceptable explanation of the action by which adhesives cause surfaces to cling together. It is obviously necessary to investigate the nature of adhesion, be it physical or chemical, and it is gratifying to note that this problem, which has such an important bearing upon many branches of industry is receiving the attention of the Committee.

Investigation of the Bucher Process

As an alternative to the more generally known methods for producing ammonia synthetically the Bucher process has always seemed attractive, even though its critics may have dealt somewhat severely with those shortcomings which must inevitably show themselves during the earlier experiences with anything which is more or less a novelty. There must, however, be a number of industrial chemists in this country who some few years ago were deeply interested in the development of the process, and an article which appeared recently in the *Journal of Industrial and Engineering Chemistry* should be sufficient to indicate that, as a result of a special investigation, very considerable progress was made. Briefly, the Bucher process consists in passing nitrogen through a heated mixture of coke, soda-ash, and iron, these three substances being, in practice, brought together in the

form of briquettes. Sodium cyanide results, and the cyanide is then hydrolysed by steaming, ammonia being yielded by this stage of the process. Just at the time when the war came to an end it was shown that the Bucher process offered a feasible and sure method for the production of ammonia without introducing the necessity for employing electrical power; but its main drawback was the relatively high cost of cyanide production, thus leading to the opinion that the ammonia obtained would be more costly than that given by either the Haber or the cyanamide processes. It was in connection with the process of steaming the cyanide briquettes that difficulties mainly arose, for while it was found that sodium cyanide and sodium cyanate were readily hydrolysed (giving practically theoretical yields of ammonia) the iron present in the briquettes gave rise to the formation of sodium ferrocyanide, which introduced certain defects.

Captain F. E. Bartell, who was mainly responsible for a very thorough investigation of the Bucher method and whose experiences are related in our American contemporary, has found that the defects of the steaming processes are quite capable of being overcome, provided that careful attention is given to certain points which he enumerates. Correct temperature regulation during the process of steaming is highly important, while the rate of steam admission is another essential feature. For instance, the amount of steam admitted must be sufficient not only to hydrolyse the cyanide and related compounds, but there must also be enough to oxidise the free iron which is present. An excess of 50 per cent. of steam over the theoretical amount would appear to be desirable. Shortly before the investigation was completed work was systematically being carried on with a continuous steaming arrangement with which the ammonia recovery was 97·8 per cent. The signing of the Armistice unfortunately put an end to the work, but it is to be trusted that some further investigation will be made, and that it may be possible to form an opinion of the economical value of the process, as compared with its rivals, under industrial conditions such as now appertain.

Waste in Industry

AMERICAN suggestions are so frequently helpful to those occupying administrative positions in industry over here that we cannot afford to miss the opinions of authoritative writers when they are dealing with problems which closely concern us as well as themselves. It may be recalled that some short while ago Mr. Hoover, the first president of the Federated American Engineering Societies, appointed a committee to inquire into the causes and best methods of eliminating waste in industry. The results of the inquiry, which occupied five months, have recently been published, and no one can fail to be impressed with the magnitude of preventable waste which has been shown to occur. An attempt has been made to analyse the sources of loss in such a way that responsibility for their occurrence can be traced to some particular departments or individuals. In this respect the rather remarkable conclusion is arrived at that over 50 per cent. of the responsibility can be placed at the door of the management and less than 25 per cent. at the door of labour, while the amount chargeable to outside contracts is least of all. The Report, however, does not leave the matter here, but devotes a large part of itself to showing how existing deficiencies may be remedied. The solution lies largely in improving organisation and executive control, and in applying sound modern principles to production, costs, sales, and purchases. There is a general exhortation to avoid elaboration in any shape or form, but to aim at simplification and standardisation in equipment and processes. Low production would appear to be the main enemy of economical operation; and, as will be heartily endorsed over here, it is contended that restricted production due to the rules and regulations of trade unions is a serious cause of waste, while loss of production due to illness and accidents is an item which few can have fully appreciated. The Report will have served a highly useful purpose if it promotes a general desire on the part of individuals to probe their departments on the lines indicated; but, unfortunately, though the majority of us have the best of intentions, we are mostly inclined to regard admonitions of the kind in our customary detached and apathetic manner.

Points from our News Pages

Some impressions of Dr. Hermann Plauson and of the organisation of the Plauson Institute are given in a further article from the pen of Dr. S. P. Schotz. (p. 198).

Further contributions to the Nitre Pot *v.* Ammonia Converter controversy are made by Mr. Charles Cooper and "Ecco." (p. 200.)

The sources, production, and treatment of epsomite are described by Mr. R. B. Ladoo, of the U.S.A. Bureau of Mines (p. 203).

An interesting review of the future of the china clay industry was given by Mr. C. A. Moreing at the annual meeting of Cornish Kaolin, Ltd. (p. 204).

Extracts are given from the first report of the Adhesives Research Committee (p. 205.)

According to our London Market Report, the demand still maintains its improved tendency and the outlook is brighter (p. 215.)

Our Scottish Market Report states that numerous inquiries have been received during the week and that the actual business booked has been proportionately good (p. 217).

Books Received

FILTRATION. By T. ROLAND WOLLASTON. London: Sir Isaac Pitman and Sons, Ltd. Pages 102. 2s. 6d.

LABORATORY MANUAL OF COLLOID CHEMISTRY. By H. N. Holmes. London: Chapman and Hall, Ltd. Pp. 127. 10s.

THE EVOLUTION OF ATOMS AND ISOTOPES. By W. D. Verschoyle. London: J. J. Keliher and Co., Ltd. Pp. 40. 1s. 9d.

A SYSTEMATIC QUALITATIVE CHEMICAL ANALYSIS. By George W. Sears. London: Chapman and Hall, Ltd. Pp. 119. 8s. 6d.

LABORATORY EXERCISES IN INORGANIC CHEMISTRY. By James F. Norris and Kenneth L. Mark. London: McGraw Hill Publishing Co., Ltd. Pp. 548. 10s.

The Calendar

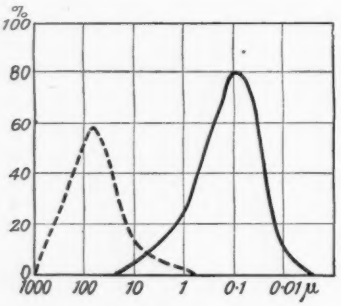
Sept. 4-9	American Chemical Society: Annual Meeting.	Carnegie Institute of Technology, Pittsburg, U.S.A.
6-13	British Association for the Advancement of Science: Annual Meeting.	City Hall, Hull.
19-22	Institute of Metals: Autumn Meeting.	Swansea.

Some Impressions of Dr. Hermann Plauson

By Dr. S. P. Schotz

The highly important article which Dr. Schotz contributed to a recent issue of THE CHEMICAL AGE *will be fresh in the minds of our readers. On that occasion some of the more obvious and important applications of Plauson's colloid mill were discussed, and these attracted considerable attention. Dr. Schotz has recently returned from a visit to Dr. Plauson, and gives below an impression of this remarkable man and his work.*

WHEN you enter the neat white building—the Plauson Institute—on the Jarrestrasse, in Hamburg, you feel at once that here is a place where all progress of modern industry is being utilised. Even in the office you find most of the latest labour-saving appliances, and the miniature telephone exchange, with its many-coloured lights, gives one the impression of a certain aim at perfection. This impression is strengthened beyond all expectation as one proceeds. The laboratories are beautifully equipped. There are plentiful supplies of electricity, gas, water, pressure, and vacuum. Cylinders containing liquefied gases are at the disposal of the chemists. A full size refrigerating plant and a collection of electric furnaces and crucibles are also conveniently installed.



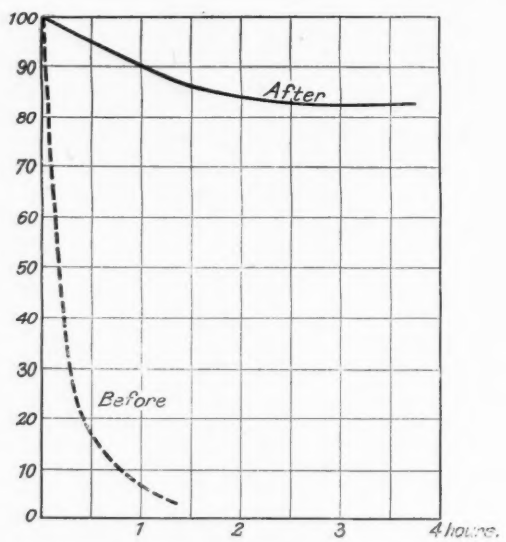
CURVE I

In the main hall are fixed several mills and presses which Plauson has designed, and a number of subsidiary machines as well. On the whole, I must admit, that though I have been through a number of university laboratories in England and elsewhere, I have not seen a place which has such up-to-date equipment and where an inventor can find such means and opportunities for work. A splendid boiler, properly set in brickwork, supplies steam up to any pressure one is likely to require. There is an engineering workshop containing machinery which not only allows the carrying out of all common repairs, but would be quite sufficient for the construction of smaller appliances of any kind. Everywhere you see labour-saving devices which permit one man to do in comfort the work of three. You can move pulleys with chains to any portion of the main laboratory without interfering with the belts, etc., of fixed machines. It is an example of an organisation regardless of cost. There can be no doubt that all expenses will be saved, if they have not been saved already, owing to the greater efficiency of labour which can be achieved by such an organisation. The laboratories for testing colloids are equally well equipped. There is no place for conjectures here. I have seen colloids produced by Plauson, and also by others, tested in such a manner that one is able to state that such and such a colloid contains particles of this or that size, and in such and such proportion. The methods of analysis are as accurate as those employed in other branches of chemistry.

Plauson has succeeded not merely in discovering new machines and methods, but also in finding men who are particularly suitable for their own branch of work.

Colloid Research

The Institute has a special department for investigating the optical properties of colloidal substances. There are ultra-microscopes galore, and these of the most perfect make. Photographs are taken of nearly every substance



CURVE II

submitted to the Institute before and after treatment in the mill, and even people who have no idea of colloid chemistry are therefore able to determine at sight the advantages of colloid mill treatment. I had also an opportunity of seeing an exhibition of samples, produced by Plauson at the exhibition of apparatus for chemical industry which has just been concluded at Hamburg. Plauson's department in the exhibition was crowded with business men from morning to night. A full range of exhibits of materials that can be produced by the aid of the colloid mill was shown, together with photographs of the materials before and after treatment in the colloid mill. Any visitor could look for himself in the ultra-microscope at the colloidal solution of barium sulphate, that heavy material which has been held up to us in our school days as one of the best examples of a crystalline insoluble substance.

By kind permission of Messrs. Plauson's Mill and Filter Press, Ltd., I am able to append curves demonstrating the

properties of their colloidal sulphur, and also two photographs of sulphur taken by means of the ultra-microscope.

Flowers of sulphur were used in the experiment. An analysis made before and after treatment in the colloid mill gave the following figures :—

Size of Particles.	Before Per cent.	After Per cent.
1,000 μ	4·8	0
1,000 μ–400 μ	27·3	0
400 μ–45 μ	58·7	0
45 μ–4·8 μ	8·6	3·1
4·8 μ–1 μ	3·5	18·2
1 μ–0·01 μ	0	78·6
0·01 μ	0	0

(μ=0·001 mm.)

FIG. 1.—MICROPHOTOGRAPH BEFORE GRINDING.

These measurements are graphically illustrated in Curve I. The dotted curve refers to sulphur before grinding, the continuous one shows the same sulphur after colloid mill treatment. As can be seen, about 80 per cent. of the sulphur has been converted into particles below 0·1 μ in diameter.

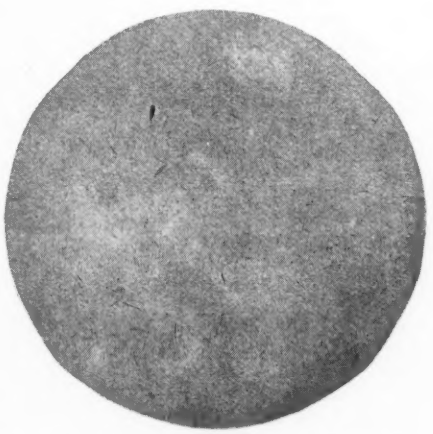


FIG. 2.—MICROPHOTOGRAPH AFTER GRINDING.

Curve II has been constructed by measuring with a special instrument the rate of settling of sulphur before and after treatment in the colloid mill. It will be noticed that colloidal sulphur (continuous curve) deposits about 18 per cent. of finely divided material during the first three hours. The rest remains stable for an indefinitely long period.

These two photographs give a visual comparison of the size of particles of both materials. Of course, it only stands to reason that during the brief time which has elapsed since the Colloid Mill was first constructed the hundreds of processes that can be suitably worked in it have not all been sufficiently perfected. Some of them are already excellent and the others give scope for future development.

From the descriptions of Plauson's Filterpress I expected to see a huge machine, not so big, of course, as the common filterpress, but still of generous proportions. I was, therefore, surprised to behold a small apparatus, the body of which is not more than about 3 ft. by 1 ft., which could be placed in the corner of some building, and is constructed in that substantial manner which gives one the impression that you can hit it with a hammer and it will still remain intact. It looks strong, durable and simple.

The Institute's Journal

The Institute has its own Patent Department, where all patents are drafted and patent searches carried out. I was surprised to notice what an intimate knowledge of English patent literature was possessed by the people in charge of this section. Here, too, the brains of Plauson have left their mark. The Institute publishes its own journal, which very wisely records not merely the writings of Dr. Plauson and members of the Institute, but also gives a brief résumé of other notable achievements of technology. It, therefore, does not sink to the level of a common advertisement, and will undoubtedly be read with much more pleasure than any publication of this type which I have come across.

Plauson, the Man

Before I saw Dr. Plauson I imagined him as a kind of professor—quiet, calm, a thinker and a dreamer. At first glance I changed my views. He is a dreamer, of course, like every inventor, but his dreams have the quality of coming true. He possesses a reserve of powerful energy, enthusiasm, confidence, and that special attribute which we call "go." He is a man, who, having once set himself an aim, will achieve it in one way or another. He is not content to get information from other people. Whenever a fresh problem crops up he proceeds to work it out and, I am sure, has never the least doubt that he will solve it. If a thing is quite out of the way, and even he, with his wide knowledge and experience, has only a superficial understanding of it, he will immediately get hold of the most recent literature on the subject, glance through it, rapidly summarise all points that matter, and next morning present you with a method typical of Plauson in its simplicity and directness.

I have seen samples of substances which already form the subject of successful large scale manufactures, and there is no doubt in my mind that the revolution started by Plauson in the chemical industry will now be going on quite independently of what he may give to the world in the future.

I do not think that any of the old-established industries are safe from his attacks, and from the comparatively brief experience of the possibilities of both mill and filterpress I can foresee still further applications. It seems to me that whatever chemical process is being used it can be simplified, shortened, improved and made to give better yields by employing the Colloid Mill instead of the mixer, digester, or common mill which has previously been utilised in the same industry. The same, no doubt, will equally apply to the Filterpress.

Relative Merits of Nitre Pot and Ammonia Converter

Some Further Points of View

Further opinions on the Nitre Pot v. Ammonia Converter controversy are given below. Mr. Charles Cooper, whose article in THE CHEMICAL AGE *of June 24 gave rise to the present discussion, deals with some of the points raised by "Questor" in our issue of July 29. "Ecco" discusses the statements made by the previous writers.*

"Questor's" Points Examined

By Charles Cooper, M.Sc.

It is in some respects gratifying, though none the less daunting, to observe the enthusiasm with which your contributor, "Questor," has tracked what he considers to be the misleadings and false deductions in the article published in THE CHEMICAL AGE of June 24 on the ammonia oxidation process. It is proposed herein to follow as closely as possible the criticism and maintain the original conclusion; although "Questor's" notes open up some very interesting side issues.

The prices used in the calculations were actually quoted by well-known dealers and makers, delivered to a consumer, a few days previous to going to print.

Since reading "Questor" the corresponding quotations, at another point of delivery, have been obtained and are as follows:—

Nitrate of soda, in 10 ton parcels, £13 17s. 6d.

Ammonia liquor 25 per cent. quality guaranteed, in tank cars, £14 12s. 6d.

The two points of delivery can be taken as representative for anywhere in the North of England, or Midlands. London districts might show slightly different prices due to carriage on one or other being relatively high.

The gross difference as calculated previously is now £4 9s. 6d. and the net £3 11s. 6d. per ton of pure $NaNO_3$.

An article in the June number of *Chemical Age*, New York, by G. B. Taylor, gives corresponding figures for nitric acid manufacture by conversion, though finally the writer has to sacrifice much of his gain to procure a marketable strength of nitric acid.

Your contributor's remarks on what quality of liquor was to be employed fail of their intent, and also the argument as to the accessibility of the ammonia. After all, there are other and stronger factors than ammonia oxidation which tend to keep acid makers and ammonia distillers in reasonable proximity one to another.

The Proposed Reduction

In the matter of the value of nitre-cake, the figure quoted cannot be applied in the North, and certainly not to the whole of the nitre-cake made. On a works where the writer was formerly employed, odd parcels were sold at a price above carriage, and the rest cost money for removal. Carriage is expensive, so the radius of availability is limited even at 22s. 6d.; this price in itself is well up to that of its sulphuric acid content, so custom is limited again. The figure is inadmissible for our general purpose. A recent report on alkali works sums up the situation in this way: that it is only too easy to tempt the consumer back to the acid itself. Even admitting the full value as approved, the balance is not materially touched. "Questor" may have to reconsider his methods of nitre supply after all.

The Advantage of the Pot

That the material costs practically govern the question of advisability ought still to hold, as the capital and running costs are covered by 18s. per ton of nitre supplied. I have read most carefully the two paragraphs headed "Personal and other factors" in both our publications. I find that in the original article the objections rehearsed by "Questor" were fairly stated and an attempt made to show that they can be reduced, or disappear, or else will not weigh against the advantages. His paragraph (*b*) has the letter and the spirit in conflict, but we both interpret in the same way the point at issue.

Your more recent correspondent, who also urges the claims of the nitre-pot is fully justified on the grounds he states; but in the opinion of the writer the advantage in simplicity is not nearly sufficient to wipe out the saving on materials. My "sound practical advice" was not to be justified on that account alone, but rather as a relation of steps, whereby the technical man devises the transference of his controls to the direct operator. A "properly operated and supervised sulphuric acid plant," such as is used for reference by "Questor," can afford to pay for intelligence in its staff quite up to the standard demanded by the ammonia oxidation plant.

Simplicity may obtain in many various processes in the same works, although the processes may represent different standards of technical interest. Given time and the normal growth of practical rules any process may become commonplace. It has been most interesting to the writer at various times to watch the growth of "rule-of-thumb" experience respecting novel plant and processes.

"Direct Use of Nitric Acid"

Your contributor's main objection under this heading arises apparently from a misunderstanding; if the sentence had read "The use of nitric acid is more favourable when it is made on the same works as the vitriol," etc., it might not have arisen. The comparison intended was, of course, against nitric acid on other vitriol works, not against nitrate in pots.

The Future

A point of great interest is raised by "Questor" when he puts the proposition which is restated thus: The fertiliser market demands nitrogen as nitrate, as well as in the ammoniacal form; by synthesis ammonia can be made cheaply, but by direct conversion (saving acid for ammonia fixation) together with cheaper absorption and fixation by alkali, nitrates may retain the market on a price ratio of the same order as obtains now; and the supply will continue to be supported by Chile and Norway.

All this might be admitted, and still the monetary advantage of ammonia oxidation in small units stands. But the expansion in the world's production and consumption of nitrogen compounds is practically confined to ammoniacal forms since 1910 (see Statistical Supplement to Final Report of Nitrogen Products Committee, 1921); so evidently there is so far no indication of a strong agricultural demand for a limiting ratio of production between the two forms. The comparatively weak position of Norwegian nitrate appears from the same report.

Any sweeping prophecy is hazardous in an industry so rapidly expanding and changing as nitrogen fixation, but caution is surely not left behind when the statement is made that present tendencies are such as should put ammonia into the commanding position in the market, which position has hitherto been held by mineral nitrates.

Experience with Both Systems

By "Ecco"

HAVING studied carefully the two recent articles in THE CHEMICAL AGE on "Nitre Pot *v.* Ammonia Converter," one is forced to the conclusion that in both cases your contributors have very decided opinions as to the superiority of the exactly opposite alternatives they favour. Probably, therefore, the slightly more moderate views of an acid works manager who can claim a lengthy experience of both systems may not be out of place, particularly as the matter has been given exhaustive trials on various sulphuric acid units.

In both articles one is struck by the fact that the pecuniary aspect is dealt with on a basis of assumption in respect to the relative quantities of nitrate of soda and ammonia required, and although the figure of 85 per cent. efficiency of conversion of ammonia may be near the mark in the average case, the only practical basis on which such a comparison may be made is one of actual experience on a particular plant.

During the writer's experiments it has been found by running a certain unit with nitrate of soda and ammonia

month and month about, that 10 lb. of 95 per cent. nitrate are equal in effect to 11¼ lb. of 25 per cent. ammonia liquor. The fact cannot be overlooked that an efficiency of 100 per cent. cannot possibly be claimed for nitrate of soda usage as, apart from the nitre-cake not being fully "burnt off" occasionally, handling losses in the shape of leaky bags, nitrate left adhering to the bags and so on, cannot be avoided.

The above comparative figures, therefore, indicate the probability of a lower efficiency of conversion than 85 per cent. in the case of ammonia, but it is well known to every chemist who has devoted any attention to the matter, that it is extremely difficult to estimate the efficiency by means of chemical tests and the figure of highest importance is the relation of the ammonia used to the acid made.

The cost of such relative quantities of nitrate of soda and ammonia is purely a matter for individual works to ascertain, but in passing, it may be mentioned that the figure of 15s. per unit for ammonia quoted in your article of July 29 is on the high side.

Supervision and Work

Far too much is made of the skilled technician question as applied to ammonia oxidation. There is no necessity whatever to utilise any extra labour—there certainly is no need to post anyone—not even a woman at two guineas a week—to watch a small stream of liquor running and to see that the gauze continues to work at a steady colour. All that is necessary is a measure of daily attention to the plant on the part of the official in charge, a certain small amount of work in the nature of chemical tests, and a periodical checking (about every two hours) of the ammonia feed, the air pressure, and the temperature of the still by a process man. The latter task is better imposed upon the tower man rather than the burner man. Your contributor's assertion that "no amount of argument will convince the practitioner that an ammonia oxidation plant possesses the same simplicity as the nitre potting operation," will therefore not hold water. On the contrary, the reverse is the fact.

Flexibility

The question of flexibility is, however, another consideration, and here undoubtedly the nitre pot method scores heavily. An ammonia oxidation plant works best when it is left alone, and it is impossible to claim, as your contributor does, that any lack of flexibility in the plant can always be counterbalanced by altering the nitrous acid feed. On any plant it is inadvisable to be continually altering tower feeds—in most cases any alteration means the readjustment of four streams of acid—and in the case of a spent oxide plant for instance, that system is wholly useless. On the other hand, it is quite a simple matter to pot a few pounds of extra "nitre" when required. In this connection it is quite impossible to agree that no properly operated sulphuric acid plant—except those working on an intensive system—should need, even for temporary periods, a double replenishment of oxides of nitrogen. Unfortunately, such replenishment is often unavoidable, for example, in cases of interruptions to acid feeds, change of raw sulphurous material, particularly in the case of spent oxide, troubles with furnaces, and the many disorganisations inevitable on any acid plant.

It must be remembered that on a unit of the size under discussion working with a consumption of $NaNO_3$ equal to 2 per cent. of the sulphur in the acid produced, the hourly potting only amounts to about 8 lb., so that a 100 per cent. increase does not involve any great amount in point of weight. Renewals to either type of plant are of little account. The renewal of a platinum gauze—which should not be necessary above once every year—is a very small matter compared to the work entailed in changing a nitre pot, but the latter operation is very infrequently necessary.

Arrangement of Oxidation Plant

The ammonia oxidation plants with which the present writer is concerned are so arranged that a few carboys of fresh condensed liquor are always kept on hand for use should extra oxides of nitrogen be required temporarily, the gas "sights" are placed in such a position that they can be easily seen by the tower man in the course of his ordinary duties, and hence any risk of the plants going out of operation for any considerable period is avoided. It should be added, however, that interruptions of that nature very seldom happen. As the plants are working fairly well up to their capacity, any disorganisation to the acid plant calling for largely increased amounts of "nitre" causes resort to be made to the use of the nitre pots temporarily.

The general conclusions arrived at are, therefore, that there is very little to choose between the two methods, but that where an ammonia oxidation plant is already installed and the men accustomed to its working, it will in most cases be found the simpler and more economical system, particularly if any difficulty is experienced with the disposal of nitre-cake. On the other hand, it is somewhat doubtful if the cost of installation of a new oxidation plant, and the expense entailed in getting the men accustomed to the change, will be recouped for some considerable time, unless ammonia liquor can be obtained at a relatively lower price.

Manufacture of Carbon Black

Industrial Processes in the U.S.A.

FORTY billion cubic feet of natural gas are used annually in the United States in the manufacture of carbon black, a material which is employed in the making of an astonishing number of articles of everyday use, states the Federal Bureau of Mines, which has completed a study of the subject. Carbon black is used extensively in the rubber industry, something like twenty million lb. going annually into the manufacture of motor tyres. From ten to twelve million lb. of carbon black are used annually in the manufacture of printers' ink, and from four to five million lb. in the making of stove polish. The product enters also into the composition of black and grey paint, phonograph records, carbon paper, crayons, typewriter ribbons, glazed paper, tarpaulins, black leather, artificial stone and insulating materials. In normal times the United States exports probably ten million lb. of carbon black in a year.

Confusion exists in the use of the terms lampblack and carbon black. Carbon black is the fluffy, velvety-black pigment produced by burning natural gas with a smoky flame against a metal surface. In its physical characteristics it is entirely different from lampblack, which is made by burning oil or other carbonaceous material with insufficient air and collecting the smoke in settling chambers. The process of manufacture most widely used at present is the so-called channel system, in which the black is deposited on the smooth undersurface of steel channels by lava-tip burners. The mechanism is inclosed in sheet-iron buildings in order that the amount of air may be regulated.

The first factory in which carbon black was successfully made on a commercial scale from natural gas was erected at New Cumberland, W.Va., in 1872. Until the utilisation of gas from the prolific gas fields at Monroe and Shreveport, La., 75 per cent. of the world's total supply of carbon black was produced in West Virginia. Increases in the price of natural gas in that State have, however, caused some manufacturers to move their plants to more isolated districts, where the gas, because of the lack of other markets, is cheap. Thus the Monroe gas field in Louisiana has become an important centre of carbon black plants. Factories are located also in Wyoming, Oklahoma, Montana, Kentucky and other States.

The results of a study of the manufacture, properties and uses of carbon black, made by Mr. R. O. Neal, consulting engineer, and Mr. G. St. J. Perrott, physical organic chemist, are given in Bulletin 192, which has just been issued by the U.S.A. Bureau of Mines.

Use of White Lead in Tunis

THE International Labour Office (League of Nations) has just been informed by the Government of Tunis of a recent decree regulating the use of white lead. This decree prohibits, after one year from the date of promulgation, the use of white lead, of plumbiferous oils and of all specialised products containing white lead, both in the internal and external painting of buildings. White lead may not be used in other operations except in the form of paste. The convention voted by the International Labour Conference in November last lays down that the use of white lead is prohibited after November 19th, 1927, in internal painting of buildings, except (under agreed conditions) railway stations and industrial establishments. Where white lead is not prohibited its use is subject to definite precautionary hygienic regulations as from January 1, 1924; cases of lead poisoning are made compulsorily notifiable.

The Government and Chemical Works

To the Editor of THE CHEMICAL AGE.

SIR,—Rumour has it amongst those who catch the echoes from the back stairs of Downing Street that the Government, in pursuance of the Washington Conference, is considering the closing down of chemical works in this country. Apart from the facts that British chemical plants are conducted by private enterprise, that they are essential to the welfare of other British industries if we are to be at all self-dependent, that they are an asset to the taxpayer and not a drain on his resources, it is difficult to conceive how a government in this or any other country that voluntarily abandoned—in pursuit of an ideal—its most economical and efficient form of self-defence, could continue to warrant the support of its electors. If the rumour be true, there is a longer story behind the Washington Conference than has been told and much more must be said about it. To say that war must cease is to express the noblest of ideals, but one seems to remember that Canute once issued peremptory orders to the waves and they paid small heed to him. This country does not want war: its citizens are utterly tired of it, but at the same time they claim not to be fools.

If the Government directly, or indirectly, secures even a limited closing of British chemical works, it will commit this country to a policy that is suicidal if we wish to remain a power in the world's counsels. We are to destroy chemistry in peace because chemistry is of use in war: then, say we, it is time we got out of this wicked world altogether.

The rumour may be a mare's nest—or it may not. It seems the height of improbability. Nevertheless, we should be more assured by a complete and prompt official disclaimer.—Yours, etc.,

August 8, 1922. M.A. CANTAB.

Popular Chemical Literature

To the Editor of THE CHEMICAL AGE.

SIR,—Mr. Macara's letter on the need for popular chemical literature interested me a good deal, and his flattering observations on my articles gave me great pleasure. I also read your leading article on "Ninety Years of Science" and found in it many suggestions which met with my sympathetic approval.

The aptitude for translating scientific work into plain English is not a natural gift: it is painfully acquired. For five-and-twenty years I spent my day writing letters (at 3s. 6d. a piece) and drawing briefs to enable a counsel to learn at short notice a complicated state of facts and expound them to a jury of very ordinary men. If the brief was well drawn there was a fair chance of winning the case, and the loser paid for my work. If the case was lost, of course one ultimately got paid just the same, but you had to wait a long while for your money and ran a risk of losing the client. This is what Professor Armstrong calls the heuristic method of learning to write. Almost all men, many women and some children could write simply on scientific subjects if they took the necessary trouble, but easy reading is very hard writing. And I venture to think that for popular reading a man should avoid a subject in which he is accustomed to think and write learnedly. He acquires a set of technical—sometimes very technical—terms which he well understands and thinks every one else does the same.

I doubt whether if I wrote an article on the Consolidation of Mortgages or the Act for the Abolition of Fines and Recoveries it would be readable. On the other hand there must be many of your readers who could write simple and popular resumés of chemical topics.

My friend Evans, an authority on "gas, which makes the politician rise," is writing a book on Gas. For popular consumption he would find it easier to write a book on the Theory of Fiddles and Whistles. But I must be careful what I say of him; he is Chairman of a Publications Committee. The present Poet Laureate wrote of him:—

> He sells his tar, he sells his therms,
> By special permit of the Nation:
> Looks after imports from the Germs,
> And now controls our Publication.

Dodgson spent much of his life on Prime Numbers and wrote a lot of stiff books about them. In his leisure moments he wrote *Alice in Wonderland*.

Some of us are considering how we can make the public take a greater interest in modern scientific developments, and we shall be very grateful to any readers of THE CHEMICAL AGE who make suggestions. We hope the Editor will respond to the hint in Mr. Macara's last paragraph.—Yours, etc.,

STEPHEN MIALL.

"Holmfield,"
157, Haverstock Hill, London.

Practical Man and Professor

To the Editor of THE CHEMICAL AGE.

SIR,—A long experience with the academic man and the manual worker leaves me with the impression that it is required that the worker should know how to do the work, but should not know why he does it—skilful hands but no brain. The effect of this can be seen in many of our industries to-day, and to this lack of knowledge may be ascribed much of our lack of real progress.

The writer had recently to use—in quoting an extract from a technical journal for the benefit of workpeople—the word "valency," and omitted to explain the word at the time. Nine separate and distinct dictionaries were consulted by the pupils without result, and they then asked me for an explanation.

The proper place to start the teaching is in the elementary school. For many years past the writer has successfully taught children down to seven years of age the essential facts of everyday work, using as examples articles used by the children in their own homes. The apparatus used to explain specific gravity to children was provided and made up by them at a pre-war cost of threepence. If the scientist really wants the worker to know why he does certain work, I feel sure that means could be evolved to enable it to be done.—Yours, etc.,

"CHINA CLAY."

Bojea, Cornwall.

Sulphuric Acid for Buenos Aires

To the Editor of THE CHEMICAL AGE.

SIR,—I beg to inform you that a telegram has been received in this Department from the Commercial Secretary to His Majesty's Legation at Buenos Aires (Mr. H. O. Chalkley) to the effect that the local authorities are advertising for tenders. It is expected that the same quantities will be required as were required last year, *viz.*—5,160 tons of sulphuric acid, 66° B., or equivalent of acid of less density, down to 50° B., and 12,000 tons of aluminium sulphate.

It is a usual condition of such tenders that local representation by a resident agent is essential, and should any of your readers not be already represented in the market, this Department will be pleased to furnish them, should they so desire, with the name of likely firms through whom tenders might be lodged.

A copy of the specification is being forwarded by mail and will be available for inspection by United Kingdom manufacturers and exporters on its receipt here. In the meantime, however, a copy of the specification and conditions of tender issued in connection with a similar call for tenders last year may be consulted on application in Room 53, Department of Overseas Trade, 35, Old Queen Street, Westminster, S.W.1.

Yours etc.,
E. H. BLISS,
For Comptroller-General.

Department of Overseas Trade
(Development and Intelligence),
35, Old Queen Street, London, S.W.1.

Kerogen from Oil Shale

Kerogen has been separated from Utah and Scottish shale in addition to standard Colorado shale, and combustion analysis have been made by the U.S.A. Bureau of Mines at Boulder, Colo. The results have been tabulated and will soon be ready for publication. All difficulties have apparently been overcome except that due to the difficulty of distributing the nitrogen.

Epsomite: Its Sources, Production and Treatment

By Raymond B. Ladoo*

THE Bureau of Mines frequently receives requests for information on the mining, preparation, and marketing of epsomite, or Epsom salt, and in order to answer such inquiries the following information has been compiled. While it is probable that few people have considered epsomite as a mineral product, it will be noted that it should be so regarded, and its production forms an important industry.

Composition.—Epsomite, Epsom salt, magnesium sulphate, $MgSo_4.7H_2O$; MgO 16·3 per cent., SO_3 32·5 per cent., H_2O 51.2 per cent.

General Description.—Commonly occurs as white, granular, fibrous, or earthy masses, or in crusts; rarely in crystals. Also is a common constituent of mineral waters.

Physical Properties.—Hardness, 2–2·5; specific gravity, 1·7–1·8; melting point, 250° C. Index of refraction, 1·433–1·461. Colour, colourless or white. Streak, white. Lustre, vitreous or dull. Cleavage, perfect brachy-pinacoidal. Transparency, transparent to translucent. Tenacity, brittle. Solubility, soluble in water. Taste, bitter and salt.

Sources of Supply

Epsomite is a common constituent of ocean, salt lake and spring waters, from which it may crystallise by evaporation. It is also formed by the action of sulphuric acid (from decomposing sulphides) on serpentine, talc, magnesite, and other magnesium rocks. At Stassfurt, Germany, it occurs in granular masses due to the alteration of kieserite($MgSO_4$ 7 H_2O).

Epsomite occurs in quantity in the Stassfurt salt deposits in Germany, and it is also produced commercially from the kieserite of these deposits. At the type locality at Epsom, in Surrey, England, it occurs in solution in mineral waters. At Montmartre, near Paris, France, it occurs with gypsum.

In Wyoming there are several epsomite localities in Albany, Converse, Laramie, Caroon, and Natrona Counties, principally in or near soda lakes. Brooklyn Lake, near Wilcox Station, Albany County, is reported to contain a large area of natural Epsom salt. Another important deposit is at Poison Lake, 18 miles from Douglas, Converse County, where a mill has been erected. Most of the epsomite in these soda lake deposits is mixed with varying amounts of mirabilite (Na_2SO_4 . 10 H_2O) or other sodium salts.

In Washington, Okanogan County, in Epsom Lake, 2½ miles north-west of Oroville, epsomite is found as a coating several inches thick on the edges and bottom of shoals in the lake. It has been mined there.

In Utah a deposit of considerable size has been reported near Manti, Sanpete County; it also occurs in Emery County. In Beaver County, on the east side of Mt. Baldy, near Beaver, Utah, epsomite is reported as crusts and crevice fillings sometimes a foot thick.

In California it has been reported in Alameda, Amador, Lake, Napa, Santa Clara, and Sonoma Counties; in Colorado at several localities in coal mines, in mineral waters, in alkali deposits, and in alkali lakes; in New Mexico at Estancia Lakes, Torrance County. Epsomite is reported in limestone caves in Kentucky, Tennessee, and Indiana. Epsom salts are also produced in the U.S.A. as a by-product in the manufacture of common salt by the evaporation process.

Epsomite occurs in Canada at several localities in British Columbia, the more important of which are: (1) In the Clinton Mining Division, 1½ miles south of Clinton, in Lillooet; (2) in the Ashcroft Mining Division, near Basque, on the Canadian National Railway; (3) in the Osoyoos Mining Division at Spotted Lake.

At Clinton the mineral occurs as a crust on an alkaline lake, about 12 acres in area. Two grades are mined: No. 1 grade, or the purer upper crust, 4 to 6 inches thick, which is sufficiently pure to be classed as technical salts, and sold as such without purification; and No. 2 grade, several feet thick, underlying No. 1, which is more or less mixed with mud, and must be purified. The salts are shipped to a plant at Oroville, Washington, for purification.

Near Basque, about 12 miles from Ashcroft, and 3½ miles from Hammond's Spur, on the Canadian Northern Pacific Railway, is a series of five lakes containing epsomite, ranging in area from two to eight acres. These lakes contain very pure epsomite, in places 40 feet thick, covered with water, up to June or July, to a depth of six inches or a foot. In the summer the water on top evaporates, leaving a solid surface of hard white crystal, which is sawed in slabs and harvested like ice. When the surface layer has been removed the saturated solution beneath evaporates, and forms a new crust, which in turn is harvested. Some of the salt solidifies, surrounded by mud rings, and must be purified, but part of it (the upper crust) is sufficiently pure to be sold as technical salts.

Below is an analysis of a sample from the upper crust:—

	Per cent.
$MgSO_4$	44·58
H_2O	50·84
Insoluble	0·76
Other soluble salts	3·82
	100·00

Epsom salt equivalent to $MgSO_4$–91·28 per cent. The lower layers must be refined, and a plant has been built at Basque for this purpose.

At Spotted Lake, near Kruger Mountain, Osoyoos division, B.D., a deposit of epsomite has been developed. The occurrence here is similar to those described above. The crude epsomite is ground and bagged at the mine and hauled by motor truck to the refining plant at Oroville, Washington.

Production and Marketing

United States:—The total production of Epsom salts, both pure and technical grades, in 1914 was about 14,632 short tons, valued at $297,000, and in 1919 29,348 short tons, valued at $1,497,000. In 1920 there were eleven manufacturers of Epsom salts producing an estimated total of about 25,000 short tons. In 1914 there were imported about 6,780 short tons of epsomite, of which about 85·5 per cent. came from Germany, 5 per cent. from Belgium, 3·3 per cent. from Italy, 3·1 per cent. from France, and 3·1 per cent. from England. In 1917, due to the war, imports had decreased to about 27 tons. No exports are recorded. Thus consumption in the United States apparently increased from about 21,412 short tons in 1914 to a peak of 29,348 short tons in 1919. Refined Epsom salts are produced in Philadelphia, Baltimore, Chicago, Cleveland, Cincinnati, Atlanta, Los Angeles, San Francisco and other localities.

Germany:—Before the war Germany was the largest producer of Epsom salts in the world, in 1905 producing 65,595 short tons, and in 1913 exporting 30,575 short tons. No more recent figures are available.

Other Countries:—In 1917 Canada shipped 929 short tons, valued at $4,645; in 1918, 1,949 tons, valued at $14,565; in 1919, 738 tons, valued at $9,115; and in 1920, 1,947 tons, valued at $39,886. In 1920 Canadian exports were 743 tons, valued at $3,737. In 1908 Italy produced 2,666 short tons.

There are two grades of Epsom salts commonly produced and marketed, the U.S.P. grade (practically chemically pure) and the technical grade which is at least 90 per cent pure and usually over 90 per cent. The technical grade is often produced in much coarser crystals than the U.S.P. grade. The salts are sometimes shipped in 100 pound burlap bags, but usually in wooden barrels. They are sold, wholesale, at a price per 100 pounds f.o.b. the principal markets, for example, New York City. The price for the technical grade varies more than that of the U.S.P. grade, due to the wider range of purity permissible.

In February, 1922, in New York markets, wholesale prices of Epsom salts were $2.65 to $2.70 per 100 pounds for the pure grades and $1.05 to $1.80 per 100 pounds for the technical grades. The present prices are undoubtedly influenced considerably by the low price at which imported German salts are offered for sale.

* Mineral Technologist to the U.S.A. Bureau of Mines.

Methods of Manufacture and Refining

Epsom salts of commercial grade are made in the following ways :—

(1) Crude salts mined and shipped as technical grade.

(2) Crude salts mined and refined by recrystallisation.

(3) Technical and U.S.P. grades made as by-product in manufacture of common salt by evaporation.

(4) By recrystallisation from kieserite (in Germany only).

(5) By action of sulphuric acid on magnesia (MgO), magnesium hydroxide ($Mg(OH)_2$), magnesite or magnesium carbonate ($MgCO_3$), and dolomite or calcium-magnesium carbonate ($(Ca,Mg)CO_3$).

(6) By recrystallisation from mineral waters (as at Epsom, Surrey, England).

The methods used in purifying the crude epsomite from Spotted Lake, Osoyoos district, British Columbia, at the mill at Oroville, Washington, are described below.*

The crude salts are dissolved in tanks by steam and the liquid run to evaporating tanks, where the solution is reduced to a specific density. It is then run to other tanks lined with magnesite cement, where it is cooled and allowed to crystallise. The remaining liquor is returned to the evaporator and the crystals are put through a Watson Laidlaw drier having a capacity of 15 tons per 10-hour day. After a preliminary drying, the crystals are spouted to a 25 ft. by 4 ft. revolving drier having a screen at the discharge end. At the discharge end of the screen is a set of steam coils and a fan so arranged that a current of hot air is drawn over the salts. The temperature is kept at less than 80 degrees, so there will be no tendency for the salts to melt.

Epsom salts, magnesium chloride and potash salts have been recovered from the residual bitterns left after the extraction of common salt from sea water and other brines, particularly at San Mateo, California.

The principal source of Epsom salts before the war was kieserite ($MgSO_4$, H_2O) from the salt deposits at Stassfurt, Germany. The crude kieserite, which is slightly soluble in water, is washed with water to remove the chlorides of magnesium and sodium. The remaining powder is packed in wooden moulds, where it sets to a solid cake containing 80 to 90 per cent. $MgSO_4$. These cakes are broken down, dissolved in hot water and recrystallised to Epsom salts.

When dolomite or magnesite is treated with sulphuric acid, soluble magnesium sulphate is formed, leaving insoluble calcium sulphate, which is removed by filtration. The resultant liquor is concentrated by evaporation and allowed to crystallise as Epsom salts. At plants in Baltimore and Philadelphia a siliceous magnesium hydroxide is powdered, treated with sulphuric acid, dried and calcined at a red heat to convert any iron salts to ferric oxide. The product is then dissolved in water, treated with sodium sulphide to remove the last traces of iron, the solution concentrated by evaporation and the Epsom salts allowed to crystallise out.

The principal use for the technical grade salts seems to be in the tanning of leather. It is also used in warp-sizing cotton cloth; in loading cotton textiles; in dyeing; for weighting silk, paper and leather; in the enamelling industries; in fire proofing compounds; in the manufacture of paints and soaps. The purified or U.S.P. grade is used mostly in the drug trade as a valuable medicinal product and in the manufacture of mineral waters.

Bibliography

Descriptions of the deposits in British Columbia are given in the Annual Report of the Minister of Mines of the Province of British Columbia for various years since 1916, particularly the 1918 report.

For a general summary of the manufacture and properties of Epsom salts see Thorpe's *Dictionary of Applied Chemistry* (Longmans, Green and Co., London), articles on Epsom Salts and Magnesium Sulphate.—U.S. Bureau of Mines, Reports of Investigations.

* *Annual Report of the Minister of Mines of British Columbia*, 1918, p. K213.

China Clay Trade Recovery

Mr. C. A. Moreing on the Outlook

PRESIDING at the ninth annual meeting of Cornish Kaolin, Ltd., held on August 3 at 2, Copthall Avenue, London, Mr. C. A. Moreing (the chairman) said that while it was a matter for regret that in the year 1921 the china clay trade suffered from the depression common to most industries, it was fortunate that this depression occurred during the construction period on the company's property. Full advantage of this was taken by pushing ahead with work, with the result that important sections of the new plant were completed in time to benefit by the gratifying revival of trade in 1922. The property had been brought to the production stage before the war, but provision had only then been made for a limited output; the outstanding features of the property were the exceptionally large reserves of china clay which were proved and the special facilities for economic working. The general managers prepared plans and estimates for the new plant, and in May of last year the board made provision for additional capital to provide for carrying them out. At that time the pit was suffering from lack of development, due very largely to shortage of labour during the war. It was their immediate concern to overtake such arrears to complete the exploration of the extensive clay areas held by the company. Details of this work were given in the general manager's report, and he need say no more than that the whole of these arrears have been overtaken and that the pit was now in a position to wash a clean product for any working face.

The exploratory work which was undertaken has proved another fine area of excellent clay-bearing land at burnt heat only a mile distant from the present working put at Glynn Valley. The site of this additional area lent itself to easy and cheap working, and the surface contours permitted of the clay running by gravity to the Glynn Valley pipe-line and drys at Bodmin Road. This large addition to their already satisfactory clay reserves would permit of considerably greater increases of output in the future than were contemplated at present. Whilst they were not ready for production during the past year, they had now completed most of the constructional work, and quite recently they had commenced production with several sections of the new plant.

Output of China Clay

Dealing with the present and future outlook of the china clay trade in general, Mr. Moreing said that in pre-war years the china clay trade was remarkably stable, and exhibited a steady growth from about 500,000 tons per annum in 1910 to 800,000 tons per annum in 1913. The industry was, however, of much older standing, and earlier figures exhibited similar tendencies. During the war the output dropped to about 400,000 tons, but in 1920 this figure rose again to nearly 700,000 tons. In 1921 the general trade depression affected this along with other industries, the output falling to a little under 400,000 tons. The year 1922 opened much more favourably, as the following figures for the first six months showed :—

January	49,027 tons	April	50,260 tons
February	48,048 tons	May	63,162 tons
March	60,189 tons	June	60,425 tons

making 331,115 tons for the half-year ending June 30, 1922, or an output nearly double that of the preceding year.

These figures indicated a steady demand, and showed a volume of trade equal to over 60 per cent. of the best pre-war figure. He ventured to say that there were very few industries in this or any other country which had shown so rapid a recovery. He was pleased to say that the company was sharing in this revival in trade. Their sales were now averaging about 1,000 tons per month, and the limited figures as yet available indicated that on this restricted output the costs were so low as to allow a good margin of profit. It was anticipated that the second dry would be finished in three months, and this would double their present capacity. They were now in a position to meet any possible reduction in prices and to make satisfactory profits, even when other producers not so well equipped and organised could only sell at a loss.

Adhesives and Cements

First Report of Adhesives Research Committee

We give below extracts from the First Report of the Adhesives Research Committee, which has been published by H.M. Stationery Office at 4s. net. It deals with casein, gelatin, vegetable and other adhesives, and contains appendices giving a bibliography of gelatin and the bearing of results obtained in recent investigations of soap systems upon the structure of gelatin gels.

THE casein cements possess certain marked advantages over gelatin glues. Their adhesive powers are nearly equal to those of the best gelatin glues. They are easily rendered fluid and keep so for a comparatively long time. They can be used cold, are inodorous, are not inclined to foam, and can be ready for immediate use since they do not require soaking or heating. Once dry they are not affected by moisture, and they are very resistant to bacterial action. The processes for the manufacture of casein in this country in the early stages of the war were found to be wasteful. In one stage of the manufacture alone—the milling process—the losses were stated in some instances to be of the order of 60 per cent. of the total weight of casein subjected to grinding.

The casein used in adhesives is the protein precipitated from skimmed milk by the action of rennet or of acids; the precipitated material is washed, dried, and finely powdered. The lack of uniformity in samples of technical casein is doubtless due in part to the variable conditions under which it is precipitated. Attention has recently been drawn to this point by Mansfield Clark, Zoller, Dahlberg and Weimar (*Jour. Indust. Eng. Chem.* 1920, 12, 1163), who recommend the use of hydrochloric acid; sulphuric acid is objectionable if the by-product lactose is to be isolated from the liquor remaining after precipitation of the casein. Clark and his collaborators recommend the use of hydrochloric acid of a fixed strength (which he has ascertained by experiment) for precipitating the casein, and for washing the latter they use water which has been acidified to the same degree. The precipitation must be carried out at a fixed temperature. This procedure, followed by prescribed processes of grinding and drying, leads, they state, to a product remarkably uniform in its chemical and physical properties. The committee are of opinion that, on scientific grounds, these methods are well worthy of consideration by casein makers in this country.

Methods of Drying

The drying stage in the manufacture of casein is one which appeared to the original Committee of the Conjoint Board to be capable of much improvement, and investigations were undertaken with this end in view. In the ordinary course of manufacture the precipitated casein, after washing and drying, is obtained in horny masses, and, before being used in adhesives, these are milled so as to pass through a 60-mesh sieve. The milling entails a considerable loss; moist grinding cannot be employed since the moist powder, on drying, is again converted into hard lumps. The method of drying casein which was elaborated as the outcome of experimental work may briefly be described as follows; the method was not carried beyond a laboratory scale. The precipitated and washed casein, after drying on cloths, is ground in a mortar. A homogeneous paste is made with water and ammonia, the latter being added until the mixture smells faintly of the reagent. The alkaline paste is then spread in thin layers on glass plates which have previously been given a coating of paraffin oil as thin as possible. The plates are then exposed to a current of air at approximately 37° C. until the casein is dry. The casein, possibly in the state of an ammonium derivative, is thus obtained in the form of thin scales, which can readily be peeled off the plates and ground to a fine powder. Sodium hydroxide may also be used in this preparation; the alkali is added until a faint pink colour is obtained upon the addition of phenolphthalein to a small quantity of the mixture; finally ammonia is added to prevent hydrolytic dissociation of the sodium salt during drying. The above method proved to be useful in yielding a product which presented no difficulties in grinding. At this stage of the investigation it was found that the method had been anticipated and further development was left to private enterprise.

Other factors influencing the uniformity of commercial casein are the presence of fat, the presence of traces of acid, and the state of division of the substance. Experiments were made to ascertain the influence of these factors upon the value of casein as a constituent of adhesives, with the results given below. (For these tests a simple casein-borax cement was used containing 15 to 20 parts of casein and 6 to 10 parts of borax.)

(*a*) INFLUENCE OF FAT: (i) The strength of the cement as measured by the Aircraft Inspection Departments' tests diminished markedly with increase of the fat content; (ii) the shear strength for plywood similarly diminished with increase of fat; (iii) the waterproofness is not appreciably affected by moderate amounts of fat.

(*b*) INFLUENCE OF ACIDITY: (i) The strength of the cement (A.I.D. tests) decreases as the quantity of acid present increases. Other experimenters have obtained similar results; (ii) the quantity of water necessary to obtain a cement of suitable consistency increases with increasing quantity of acid left in the casein; (iii) if an excessive amount of acid be present it is impossible to obtain the casein free from lumps.

Free mineral acid attacks casein, giving gelatinous products in the first place; the latter form a coating round more casein and thus lead to "lumpiness." The casein is contaminated with organic impurities affecting its physical properties, while other new factors are introduced owing to the liberation of boric, silicic acids, etc., by the simultaneous attack of the original free acid upon the borax, sodium silicate, etc., used in the cement.

(*c*) INFLUENCE OF FINENESS: Mixtures prepared by using 30, 60 and 90-mesh casein gave results indicating increase of strength with increasing fineness. It was found, however, that if the 30-mesh casein was left to soak for some time the resulting cement approximated in strength to that prepared from 90-mesh casein. This would appear to indicate that the best results are to be obtained from casein in a form in which it most readily reacts with the remaining compounds of the cement.

As the result of a large number of trials for the purpose of devising a cement which would have good keeping qualities as well as good adhesive properties the following formula was evolved:—Casein, 78 per cent.; dry sodium carbonate, 4·5 per cent.; sodium fluoride, 4·0 per cent.; freshly slaked lime, 12·5 per cent.; sodium arsenate, 1·0 per cent. All ingredients must be ground to pass a 90-mesh sieve. For use, this cement may be mixed with (*a*) water, and (*b*) a weak solution of gelatin glue. The results show that a cement prepared according to the formula given has adhesive properties and keeping qualities nearly as good as—and in some cases superior to—the imported American cement. The resistance of the new cement to bacterial action was found to be very good.

Gelatin Adhesives

The gelatin adhesives, commercially known as glues, are obtained by extracting animal tissues, chiefly bones, skins, cartilage and tendons, with boiling water. At present little is known as to the relationship between the chemical composition and the physical properties of glues, and there is certainly no generally acceptable chemical criterion of the adhesive quality of a glue. As a result of their preliminary inquiries the Committee decided to inquire into the physical state of the gelatin aggregate and its relation to the adhesive properties of glues, and the action of salts upon the aggregate; to examine the relationship between the chemical properties of glues and their adhesive strengths for the purpose of developing chemical tests by which the adhesive quality of glues may be estimated; and to investigate the effect of various preliminary treatments during the preparation of a standard gelatin from raw materials, including an examination of the effect of heat upon gelatin and its solutions. The inquiry is still in progress.

Destructive Effect of Alkalis

Gelatin, the basis of glues, is a substance of complex molecular composition which is readily broken up into simpler bodies, such as amino-acids. This decomposition is brought about by dilute acids or alkalis, and possibly even by water alone under certain conditions. For this reason, prolonged heating with water, or relatively short heating with acids or alkalis, tends to break up gelatin, and consequently glue, and poor gels are the result. While the gel-forming power of a glue is not an absolute criterion of its value, yet it is generally the case that a gelatin or glue which forms a poor gel is not a good adhesive. The detrimental effects of water, acids and alkalis upon glue are in the order named, alkalis being much more destructive than the other two. In the preparation of glue from bones, hides, etc., the extracting liquid should be as nearly neutral as possible (special care being taken to avoid the presence of free alkali), and the period of heating should be as brief as possible, having due regard to other conditions.

As an extension of the work relating to the determination of the most suitable conditions for the extraction of glue, an attempt has been made to ascertain the nature of the reactions taking place during the production of gelatin from bones, tendons and skins. The evidence seems to show that these animal tissues contain substances known as ossein and collagen, which combine with water to form gelatin. Thus, during the extraction of glue or gelatin, two reactions may take place :—(*a*) Hydrolysis of ossein or collagen to form gelatin ; (*b*) hydrolysis of gelatin giving harmful degradation products. Fortunately the first reaction appears to proceed much more rapidly than the second, but the existence of the latter must be borne in mind. The extraction of tendons and skins is carried out technically at comparatively low temperatures, but when undecalcified bones are used higher temperatures are employed, and poorer glues, as a rule, result. The general conclusions to be drawn from these investigations may be summarised thus :—(i) Excessive heating of glue or gelatin solutions is to be avoided. The concentration of gelatin solutions at relatively low temperatures *in vacuo* yields a superior product ; (ii) digesting liquids should be as nearly neutral as possible ; (iii) in cleaning skins and tendons preparatory to use in glue manufacture the strength of the alkali solution used should be less than 2 per cent. ; (iv) a gelatin can be obtained from ground, undecalcified bones (1/32nd inch diameter) by digestion at a temperature not exceeding 100° C. ; (v) Acids or alkalis used for the preparation of bones, tendons and skins must be removed as completely as possible before digestion. The removal is best effected by washing with (*a*) water, (*b*) weak acid or alkali to neutralise any residual alkali or acid, and finally with (*c*) water once more.

The Diffusible Nitrogen Test

In the course of the work of the Committee a new method of testing glues has been evolved, and to it may be given the above title. The test supplies an indication of the stability of the glue towards water, and the results of the test when applied to different glues furnish a rough measure of their tensile strengths, the stronger glues having generally a low diffusible nitrogen. This is not, however, universally the case. Glues of good adhesive strength have been obtained that yield jellies when prepared according to the specification in this section, which, on application of the Diffusible Nitrogen Test, pass entirely into solution.

The Committee considered it an essential preliminary to the study of the factors influencing the quality of a glue that a standard gelatin should be prepared from a known source by scientifically-controlled methods. Such a study might throw incidental light upon the processes occurring in the manufacture of glue and gelatin ; it may be added that this, in fact, has been the case. It would seem that gelatin does not exist, as such, in animal tissues, but is there found in the form of ossein or collagen, which are probably anhydrides of gelatin. This view as to the nature of the precursors of gelatin was put forward by Hofmeister more than 40 years ago. Hofmeister found that on heating gelatin at 130° C. for a prolonged period he obtained a substance which could be brought into solution only by continued heating with water, the solution so obtained giving a strong gel on cooling. In the course of the present work Hofmeister's experiment was repeated by heating gelatin *in vacuo* at 140° C. A product similar to his was obtained, and on prolonged heating with water and cooling it yielded a firm jelly. Hofmeister's view is thus partially confirmed. A simple experiment still further strengthens the view. Gelatin is readily dissolved by a normal solution of sodium salicylate in the cold, and a very viscous solution containing 20 per cent. or more of gelatin can thus be prepared. A similar sodium salicylate solution extracts no gelatin from untreated tissues ; these must be subjected to the action of water and heat before gelatin is obtained.

Vegetable Adhesives

A promising direction in which to look for adhesives from new sources seemed to be towards the vegetable proteins, and especially those which are contained in the residues of seeds used commercially for their oil. Preliminary experiments were therefore made upon the residues remaining after the extraction of the oils from cotton seed, hemp seed, linseed, castor bean and palm kernels. Linseed gave poor results on account of the large amount of mucilage in the seed, while the residues from palm kernels were found to contain only 1 per cent. of protein. Better results were given by cotton and hemp seeds and castor bean residues. Of these the last is most promising ; it cannot be used as a foodstuff for cattle since it contains a toxic compound, and hitherto little use has been found for it ; to a limited extent it is employed as a fertiliser in the neighbourhood of Marseilles.

Castor bean meal is rich in protein. The latter is insoluble in water, salt solution and aqueous ammonia, but is soluble in caustic alkalis, sodium carbonate and strong acids. In the present investigation the protein was extracted by digesting the meal at room temperature with 0·4 per cent. sodium hydroxide solution for three to four hours. After filtration and clearing in a Sharples' centrifuge, the solution was neutralised by the addition of hydrochloric acid. The precipitated protein was then thoroughly washed and dried by one of the following three methods :—Ether treatment ; exposure to a current of air ; scale drying after solution in the minimum quantity of alkali. Attempts made to substitute sodium carbonate or acids for the sodium hydroxide in the extraction process were ineffective. The material thus obtained by alkali extraction is doubtless a mixture of proteins. It cannot be used directly as an adhesive, but must be mixed with a base and a salt. Of the bases tried, magnesia together with caustic soda gave good results, but zinc oxide and barium hydroxide were unsatisfactory. Slaked lime was, on the whole, found to be the most convenient base. Experiments were carried out to discover the most suitable salt and to determine the optimum relative proportions of protein, salt, alkali and water. It was found that sodium fluoride was the most satisfactory salt to employ. These investigations have shown that it is possible to utilise the proteins of the castor bean in the production of a satisfactory substitute for casein cements. Unfortunately, however, it is necessary to subject the proteins to a preparatory treatment—precipitation from an alkali fluoride mixture—in order to obtain a cement which does not deteriorate rapidly on standing. This treatment makes it impossible to produce the protein cement at a cost which would enable it to compete with casein adhesives in the open market.

In addition to the researches already described, the Committee have made further exploratory inquiries concerning other adhesives. While these inquiries have not led to any very positive or useful results, it may be advantageous briefly to refer to them here. Blood adhesives, which contain the coagulable protein of blood, are put to an important use in the manufacture of plywood. Experimental work in connection with these adhesives was commenced by the original Committee, but it was relinquished during the war in favour of more important or more promising lines of work ; the results were not of sufficient significance for description in this report.

Phenol-Formaldehyde Condensation Products

Much attention has been given during recent years to the products of the phenol-formaldehyde condensation, but this attention has been very largely directed to the production of plastic materials rather than of adhesives. It may be recalled that perhaps one of the most successful of the earlier methods of producing these condensation products was that of Story (Brit. Pat. 8875/1905), who used excess of phenol, and

obtained a viscous mass which was poured into moulds and slowly dried at 80–100° C. The product was an infusible, insoluble, transparent mass which could easily be worked. Baekeland (see *Journ. Ind. Eng. Chem.* 1909, I, 545) modified this process by condensing equimolecular quantities of phenol and formaldehyde in the presence of a small quantity of a base. The reaction proceeds in two stages, viz. :—(i) Condensation of phenol and formaldehyde, in the presence of a catalyst, with the formation of a liquid or viscous product soluble in alcohol, glycerine, acetone, etc. ; (ii) transformation of the first product into an insoluble and infusible mass by heating it at high temperatures under pressure. The final product is the material known as Bakelite. Subsequently Baekeland described (Brit. Pat. 26614/1911) an improved cardboard, in which was used as binding agent the product obtained in the first stage of the reaction, dissolved in alcohol. In view of this use of the condensation products, it appeared possible that an adhesive of this nature might be used in the manufacture of plywood.

To test this possibility two panels of plywood were prepared, using as a binding agent an alcoholic solution of the first condensation product as described under (i) above. The results were encouraging, but certain difficulties became evident in the course of the work. The solvent alcohol is expensive, and it is impossible to avoid its rapid evaporation since the solution must be applied hot ; the result is that an uneven layer of adhesive is obtained. Different portions of the two plywoods prepared gave irregular results on testing, a fact which points to unevenness in the application of the adhesive ; thus the tensile strength of a number of samples of the two panels were found to vary between 136 and 330 lb. per square inch. A further difficulty arises from the fact that in order to convert the soluble condensation product into the insoluble and infusible one, it is necessary to heat the wood to temperatures at which charring begins. The plywood so obtained was, in consequence, not so elastic or flexible as the ordinary plywood made up with blood adhesives.

Excess of Phenol

When, instead of using equimolecular proportions of phenol and formaldehyde, excess of the former was employed, the first product was transformed into an insoluble second product at a lower temperature ; moreover, the end product was more elastic than before, and could be used in admixture with camphor or even gelatin. The adhesive was prepared as follows :—100 parts of phenol, commercial carbolic acid or mixed cresols were heated on a water-bath, under a reflux condenser, with 50 to 80 parts of 40 per cent. commercial formaldehyde solution. When pure phenol or cresols were used it was found necessary to employ a small quantity of a catalyst in the form of a mineral or an organic acid, a mineral or an organic base, or a salt which yields a weak acid and a strong base on hydrolysis. If the catalyst was used in any but small quantity the reaction was difficult to control. The heating was continued for 8–10 hours. When the highest proportion of formaldehyde was used (80 parts) the reaction mixture separated into two layers, the upper of which could be removed ; this, however, was not essential. The product was a liquid either transparent or of creamy appearance, according to the nature of the phenols employed. The liquid was evaporated down in open vessels to the consistency of a thick syrup ; an excess of ammonia solution was then added, and the heating continued for a short time to drive off the bulk of the ammonia. The adhesive so obtained has the consistency of ordinary glue solution at the same temperature, and can be applied by brush or by heated rollers.

In mechanical trials of this adhesive, the fracture in every case occurred in the wood at pulls of between 1,288 and 896 lb. per square inch ; it was, therefore, impossible to compare the results with those given by ordinary glues, but it is probable that the average strength is at least equal to that of good airscrew glue. Plywood prepared with wet veneers had good waterproof qualities, and the shear test gave an average value of 212 lb. per square inch, which is little above the value for ordinary veneers. With dry veneers the results were much higher ; panels prepared with the condensation product were compared with plywoods made from several casein and blood cements, the comparison being generally favourable to the condensation product.

Fuming Sulphuric Acid

Action on Cast and High Silicon Iron

When apparatus constructed of cast-iron or high silicon iron is used for the handling of fumigating sulphuric acid, cracks frequently occur from no apparent cause, and in some cases heavy pipes which are not subjected to any unusual strain crack longitudinally with a loud report. Mr. T. E. Banigan, who has studied the prolonged action of fuming sulphuric acid on a high silicon iron alloy, states, in an article in the *Journal of Industrial and Engineering Chemistry*, that both the alloy and the silicon were attacked at room temperature with the production of silicon dioxide, and that the silicon carbide was not attacked even at a temperatuere of 100° C. Amorphous silicon was not attacked by 90 per cent., sulphuric acid acting for one week at a temperature of 100° C. The conclusions drawn from experiments made are as follow :—The sulphur trioxide in the fuming acid readily oxidises silicon, either free or alloyed with iron. High silicon alloys are rapidly corroded by the fuming acid, since the silicon is oxidised to voluminous silica (silicon dioxide), and a fresh surface is continually exposed. In cast iron and malleable iron, the sulphur trioxide penetrates the pores, oxidises the silicon, and produces silica, which occupies a larger volume than did the silicon from which it was derived. An internal strain is thereby created, and gives rise to the failure of the apparatus. Apparently neither the silicon carbide nor the carbon in the casting has any action on the acid or any responsibility for the failure of the apparatus.

Institute of Metals Autumn Meeting

The following communications are expected to be submitted at the autumn meeting of the Institute of Metals, to be held at Swansea from September 19 to 22 : Sixth Report to the Corrosion Research Committee of the Institute of Metals on the Nature of Corrosive Action, and the Function of Colloids in Corrosion, by Guy D. Bengough, M.A., D.Sc., and J. M. Stuart, M.A. ; a Report to the Aluminium Corrosion Research Sub-Committee of the Corrosion Research Committee of the Institute of Metals on Experiments on the Oxide Method of Determining Aluminium, by J. E. Clennell, B.Sc. ; " Grain-Size and Diffusion," by Professor J. H. Andrew and Mr. Robert Higgins ; " The Structure of Eutectics," by F. L. Brady, M.Sc. ; " The Antimony-Bismuth System," by Maurice Cook, M.Sc. ; Note on " The Effect of Superheated Steam on Non-ferrous Metals used in Locomotives," by Sir Henry Fowler, K.B.E. ; " The Constitution and Age-Hardening of Alloys of Aluminium with Copper, Magnesium, and Silicon in the Solid State," by Marie L. V. Gayler, M.Sc. ; " The Hardness of the Brasses and some Experiments on its Measurement by Means of a Strainless Indentation," by F. W. Harris, M.Sc. ; Note on " The Cause of Red Stains on Silver-Plated Work," by A. Jefferson ; " New Forms of Apparatus for Determining the Linear Shrinkage and for Bottom-Pouring of Cast Metals and Alloys, accompanied by Data on the Shrinkage and Hardness of Cast Copper-Zinc Alloys," by Dr. F. Johnson and W. Grantley Jones ; " Intermetallic Actions : the System Thallium-Arsenic," by Q. A. Mansuri, M.Sc. ; " White Metals," by A. H. Mundey, C. C. Bissett, B.Sc., B.Met., and J. Cartland, M.Sc. ; " The Effects of Overheating and Melting on Aluminium," by Dr. W. Rosenhain, F.R.S., and J. D. Grogan, B.A. ; Note on " The Cleaning of Aluminium Utensils," by R. Seligman, Ph.D., and Percy Williams, B.Sc. ; and " The Copper-Rich, Aluminium-Copper Alloys," by D. Stockdale, B.A.

Textile Research Fellowships

The British Research Association for the Woollen and Worsted Industries announce the following awards of Research Fellowships and Advanced Scholarships for 1922–23 :—Mr. G. W. Chester, M.Sc., of Liverpool, £200 to conduct research on wool fats at the University of Manchester ; Mr. John L. Raynes, B.Sc., A.I.C., of Nottingham, £100 to conduct research on the bleaching of wool at the University College of Nottingham ; Mr. George Barker, M.Sc., of Baildon, £100 to conduct research on the action of water on wool as regards strength, elasticity, lustre, dyeing properties, etc., at the University of Leeds. Scholarships have been granted to Mr. Arthur Banks, Keighley, tenable at Bradford Technical College ; and Mr. William B. Elliot, Hawick, tenable at the South of Scotland Central Technical College, Galashiels.

Chemical Industry of Switzerland

Some Post-War Developments

THOUGH the chemical industry of Switzerland was already highly developed long before the war, the latter stimulated the manufacture and export of chemicals to such an extent that at present, according to the official report on the Swiss chemical industry in 1920, the value of dyes, pharmaceutical products, synthetic and artificial perfumes, paints, varnishes and lacquers almost equals the value of the same products manufactured in Germany.

A few instances will illustrate the remarkable growth of Switzerland's chemical industry. The exports of tar dyes and artificial indigo, which in 1913 totalled only 29,000,000 francs, reached, in 1920, 211,000,000 francs. The chief purchaser of indigo is China, which buys about 84 per cent. of the total exports of Swiss indigo (valued at 13,000,000 francs). Of the other dyes, Great Britain purchased, in 1920, 62,750,000 francs' worth; France, 49,200,000 fr.; U.S.A., 16,000,000 fr.; Belgium, 15,500,000 fr.; Italy, 15,500,000 fr.; South America, 8,000,000 fr.; Japan and China, 6,500,000 fr.

Next to the Farbwerke Meister Lucius and Brüning, the Swiss Society of Chemical Industry in Basle (capital 20,000,000 francs), is the largest manufacturer of artificial indigo in the world, the principal factory being situated at Monthey. The same concern is at the head of the pharmaceutical industry, which mainly turns out synthetic remedies, while Hoffmann La Rorhe, Ltd., and S. A. ci-dev. B. Siegfried Zofingue are the chief producers of alkaloids, such as aconitin, apomorphin, atropin, cocain, codein, morphin, strychnin, theobromin; furthermore, they prepare galenicals, anæsthetics and narcotics, disinfectants and biological products. The value of the exports of the above products reached in 1920 the total of 32,000,000 fr., of which nine million were for vegetable extracts, powders, pastilles; 11·7 millions for alkaloids; and 11·1 millions for synthetic remedies. The manufacture of saccharine also went up from 0·8 million fr. in 1913 to 4½ millions in 1920.

The export of perfumery rose from 6 millions in 1913 to 13 million fr. in 1919 and 23·5 millions in 1920. The best customer is France, with about 7 million francs, followed by U.S.A. (4·5 million); Great Britain (3·1 million); Italy (1·1 million); and Spain (0·9 million).

Failure of a Chemical Merchant

A SITTING for the public examination of Louis Jules Fort, trading as F. Ford and Co., oil, colour and chemical merchants, Bush Lane House, Cannon Street, London, was appointed to be held at the London Bankruptcy Court on Tuesday before Mr. Registrar Francke. The Official Receiver said that although the debtor had attended under the proceedings he had not lodged any statement of his affairs despite the fact that on June 9 a certain firm were appointed to assist in its preparation. Consequently there was apparently no excuse for the delay. His Honour made an order on the debtor to lodge the required document within 14 days, and adjourned the examination until November 22.

Coconut Oil Industry in Fiji

AN interesting trial shipment was sent recently to London of the first coconut oil and oil meal crushed by Island mill. the Pacific Oil Mills, Ltd., who erected the first oil crushing plant at Suva last year. The capacity of the plant will run to the crushing of about 4,000 tons of copra a year, which is quite a small quantity, as coconut oil mills go. On the other hand, states the Suva correspondent of *The Times*, there are some features in the enterprise which suggests that it may be successful. It is the only coconut oil mill in the Western Pacific. As such, it has a fairly large area in which to market its products without having to face very severe competition from the larger mills of the East. For example, a considerable quantity of oil will be used for the manufacture of soap for sale in Fiji and the neighbouring island groups. The refined oil may attract the taste of Fiji's Indian population and thus provide a substitute for the mustard oil of commerce—that almost inevitable ingredient of every Indian dish.

Fertiliser Manufacturer at Muscle Shoals

Operation of the Haber Process

ACCORDING to Mr. H. E. Howe, editor of the *Journal of Industrial and Engineering Chemistry*, the future production of fixed nitrogen in America is menaced by the possibility of the restoration by the United States Government of patents, now held by the Chemical Foundation, to their former owners. In his opinion the development of methods which appear to offer the best possibilities of producing cheap nitrogenous fertilisers would be jeopardised by the restoration of the German monopoly, which directly affects the Muscle Shoals project. The larger plant at Muscle Shoals, as has been pointed out repeatedly, is a cyanamide plant, and at the time this plant was built the question of cost of production was of secondary importance. The smaller plant at Muscle Shoals, known as Plant No. 1, intended to use a modification of the Haber process, was an experimental plant. A commercial plant was built later and is in successful operation by one of the great American chemical companies. Progress in various parts of the world indicates clearly—continues Mr. Howe—that the coming process of fixing nitrogen, at low cost, is the Haber process or a modification of that process. Meanwhile, the development of the Haber process in the United States, will be practically stopped in the event of the group of patents now held by the Chemical Foundation being returned to Germany. He states in conclusion that experts generally agree that unless the Haber process can be developed, there is not the remotest chance of Henry Ford or any one else being able to operate Muscle Shoals or any other plant for the fixation of nitrogen on an economical basis.

Manufacturing Chemists' Affairs

UNDER a winding-up order made against Acte and Co., Ltd., 70, Newman Street, London, who had carried on business as manufacturing chemists, the statutory meetings of the creditors and of the shareholders were held on August 1 at the Board of Trade Offices, 33, Carey Street, London, Mr. J. B. Thompson, Official Receiver, presiding. A statement of affairs was submitted in which the liabilities were returned at £26,864, of which £21,647 were expected to rank, and estimated assets £5,217, the whole of which were required to meet the claims of the debenture holders. A total deficiency of £24,508 was disclosed with reference to the shareholders. The chairman reported that the company was incorporated in August, 1910, with a nominal capital of £4,000 in £1 shares, and was formed to buy the stock-in-trade and to carry on the business of Acte and Co., 85, Fleet Street, London. The capital at the date of the winding-up order, which was made on February 28, was £2,861, issued for cash and fully paid. In July, 1916, a deed of assignment was executed by F. J. Atkinson, the executrix of the will of the late Charles Higham Atkinson in favour of the company, transferring the whole of the interest in the business of manufacturing and vending of patent medicines which had been carried on by the deceased under the style, *inter alia*, of the "Antipon" Company, including trade marks, book debts and orders in hand and stock. The consideration for the assignment was £1,350, which was provided by Mrs. Lily Powell, who received shares in the company therefor. The premises in Store Street, where the "Antipon" business was conducted were also acquired on a yearly tenancy at an annual rental of £150. Mr. Powell stated that in 1917 two formulæ for the manufacture of "Urace" and "Vikuck," preparations used for the cure of rheumatism, were acquired, and they were afterwards made up by various manufacturing chemists on behalf of the company. It was decided to leave the liquidation in the hands of the Official Receiver.

Allies' Conference and German Dye Factories

AMONG the French proposals made at the Allies Conference in London this week was one whereby the Allies would take a 60 per cent. share in factories, and especially the dye factories on the left bank of the Rhine. This was regarded by the Conference as a proposal which would produce no cash, since the only manner of taking over a 60 per cent. share of profit would be to compel the German Government to buy out the present proprietors and hand their share over to the Allies.

Chemical Matters in Parliament

Poison Gas Manufacture

Mr. FOOT was informed by Sir R. Sanders (House of Commons, August 4) that poison gas was only manufactured in this country in such small quantities as were required for research and experiment, and the number of persons engaged in such manufacture and in research relating thereto was eight full-time and four part-time employees, at an estimated total cost this year of £8,000. These figures did not include the personnel and expenditure for research and experiment on protection against gas attack.

Oil Storage Tanks

Major Glyn was informed by Sir P. Lloyd-Evans (House of Commons, August 2) that storage tanks could be utilised interchangeably for various grades of oil, but it was estimated that about 120 million gallons' capacity was at present reserved for motor spirit. There was no consumption in this country of crude oil, but it was estimated that accommodation for nearly 1,000,000 tons of fuel oil in commercial tankage was available in Great Britain. There seemed no reason to suppose that the present provision was inadequate, or that special steps to increase it were necessary.

Manufacture of Morphine

Replying to Viscountess Astor (House of Commons, Aug. 2), Sir J. Baird said that 643,985 oz. of morphine were made in this country in 1920. No statistics of the amount used for home consumption were available. According to the returns supplied by the Customs, 322,464 oz. of morphine and heroin were exported, but these figures did not include amounts exported by post or the amounts exported in the form of preparations. The manufacture of morphine could only be carried on in this country under Home Office licence. Owing to the stoppage of supplies, of Turkish and Persian opium, Indian opium was imported into the United Kingdom during the war for the manufacture of morphia required for the British and Allied armies. It was sold to the manufacturers in this country. The balance of the stocks were reshipped to India early in 1920, and Indian opium was not at present being used by British morphia manufacturers.

Australian Zinc Concentrates

Replying to questions by Mr. D. Davies (House of Commons, August 14), Sir W. Mitchell-Thomson said that, as had already been stated, with a view to enabling zinc smelting works in this country to resume operations, and as a temporary measure certain quantities of zinc concentrates were being supplied to them at special terms. He was aware of the position as regards zinc mining companies in this country, but as they were unable to supply at prices which zinc smelters could pay in view of the low market price for smelter, the choice appeared to lie between unemployment in two industries or in only one. As the usual returns had not yet been received from Australia, it was not possible to state what charges, including transport in Australia, loading, freight, insurance, discharging, commission to agents, agents' fees and expenses, brokerage, etc., were incurred by the Government on the zinc concentrates purchased in Australia and sold for smelting in this country during the six months ended June 30 last. The estimated amount of the loss per ton on Australian zinc concentrates delivered in this country during the six months ended June 30 last was £3 14s. 8d. No deliveries were made on the Continent during that period.

Refining of Shale Oil Naphtha

WORK has been done at Boulder, Colo., by the U.S.A. Bureau of Mines on the experimental refining of shale oil naphtha. The work has been somewhat limited on account of inadequate equipment, but with the equipment now ordered should progress rapidly. Work done so far indicates that for this particular naphtha, at least, the best results are obtained by using 70 per cent. sulphuric acid, followed by the regular water and caustic soda wash and doctor treatment. The naphtha refined with 70 per cent. acid has held its colour much better than that refined with acid of greater or less strength, and so far it has deposited no gum.

Chemical Manufacturers' Losses

UNDER a winding up order made against the Russell Oil and Chemical Co., Ltd., York Works, Short Road, Stratford, London, the statutory meetings of the creditors and of the contributories were held on August 13 at the Board of Trade Offices, 33, Carey Street, London, the Official Receiver presiding. A statement of the company's affairs was submitted showing the position as at November 29 last, according to which the unsecured liabilities amounted to £11,968, in addition to which there were preferential claims, £939, and loans on debenture bonds amounting to £3,704. The assets, which were estimated to realise £8,167, chiefly consisted of stock in trade £1,691 (cost £3,382), machinery £250 (cost £1,999), and good book debts £5,638; and, after deducting the amounts due to the preferential creditors and to the debenture holders, there was a balance available to meet the unsecured claims of £3,523, or a deficiency of £8,444. The Official Receiver reported that the company was incorporated on May 2, 1913, with a nominal capital of £1,000 to take over as a going concern the business of oil and chemical manufacturers which had been carried on at 35, Adam Street, Birmingham, by Russell Brothers. The issued capital was £451, of which £450 was in part payment of the purchase consideration, while £1 represented a share subscribed for cash. The directors of the company had been William Russell and George Fox Elliott, who were acting at the date of the winding up order, and H. J. Moseley. Mr. Russell was appointed the managing director, and at the end of 1917 his remuneration was at the rate of £1,000 per annum. He also acted as secretary of the company without remuneration. There seemed to have been another business connected with the company; this was a concern called Russell's British Oil Co., which provided an outlet for this company's goods in the Bournemouth district on a commission basis. The trading results as a whole for the first two years showed a very small profit. Mr. Russell attributed the company's failure to the abnormal drop in prices owing to the slump and to heavy expenses in connection with arbitration proceedings arising from contracts entered into by the company. It seemed to the Official Receiver to be clear that from the first the company possessed insufficient working capital and it was only able to continue trading with the aid of loans partly from the bank obtained by pledging security belonging to Russell and his co-directors. The liquidation remained in the hands of the Official Receiver. Among the principal creditors are:—Allen Liversidge, Ltd., London, £326; Baird and Tatlock (London), Ltd., London, £28; Immingham Carbide Co., Immingham, £25; Lubricating and Fuel Oils, Ltd., London, £509; London Dye Manufacturing Co., London, £21; Meade-King, Robinson and Co., Ltd., Liverpool, £33; Scott, A., G., and Co., Ltd., London, £168; and Thorn and Hoddle Acetylene Co., Ltd., London, £61.

Recent Wills

Mr. Charles Henry Chester, Station Road, Ainsdale, Lancs, chemist £3,028

Mr. Fred William James, Theodore Road, Port Talbot, Glamorgan, analytical chemist..... £3,903

Mr. James Bryce, of Hollybrook Road, Clontarf, Dublin, Irish manager of the Manchester Chemical Co., Ltd..... £2,002

Mr. Charles Frederick Carter, The Limes, Welholme Road, Grimsby, lately general manager of the Great Grimsby Coal, Salt and Carbide Co., Ltd. £15,838

Mr. Frederick Arthur Crisp, Little Wenham Hall, Suffolk, one of the proprietors of Joseph Steedman and Co., manufacturers of patent medicines..... £163,832

Mr. William Henry Goddard, 15, De Vere Gardens, Ilford, Essex, manager of the export department of Charles Zimmermann and Co. (Chemicals), Ltd., 9 and 10, St. Mary-at-Hill, London, E.C. £5,138

From Week to Week

MR. EDWARD HOOPER has joined the board of the Namaqua Copper Co. as chairman and managing director.

A project for obtaining SALT FROM THE SEA on a large scale near Haifa, Palestine, is said to be contemplated.

Dr. R. F. RUTTAN left London on Wednesday for Liverpool with the intention of sailing for Montreal yesterday (Friday).

MR. E. V. JONES, F.I.C., public analyst for Wolverhampton, a keen tennis player, has won the Deykin Cup for men's singles for the ninth time.

Dr. M. O. FORSTER, F.R.S., has been appointed director of the Indian Institute of Science, Bangalore, and expects to leave London on October 13.

Compounds made with BARIUM CARBONATE are reported to have been phenomenally successful in the extermination of rats in Kenya Colony.

As a result of recent experiments, Professor Hopkins, of Cambridge, says that some of the VITAMIN CONTENT of animal fat is destroyed by oxygen.

French exports of CHEMICAL PRODUCTS to Great Britain during the last six months are reported to have reached the record quantity of 260,000 tons.

COMPLAINTS have been made against the removal of tannic acid and gallic acid from the Board of Trade's list of dutiable articles under the Safeguarding of Industries Act.

AN EXPLOSION which occurred on Monday at the slag heaps of the metallurgical works of La Providence at Marchienne-Au-Pont, Belgium, resulted in serious injury to four persons.

At an inquest held at Pannal, on August 1, on Mr. FRANK HUGHES, analytical chemist to the Egyptian Board of Agriculture, the coroner found that Mr. Hughes was drowned by misadventure.

With a view to combating unfavourable prices, the Chilean Government is understood to have decided to establish credits in favour of NITRATE PRODUCERS against guarantees of 400,000 tons of nitrate.

Applications are invited by August 26 for the post of AGRICULTURAL CHEMIST at the Harper Adams Agricultural College. Particulars are obtainable from Mr. R. P. Liddle, Newport, Salop.

Following the increase in the cost of living index figure, the WAGES OF OPERATIVE DYERS in Yorkshire have been advanced. The increase, which was received on August 4, amounts only to a few pence per week.

The improvement of the STATUS OF ENGINEERS is one of the objects sought by the formation of an Engineering Joint Council, which has just received the approval of various institutions connected with the profession.

Messrs. W. B. Mitford, R. Slye and E. Blackwood Wright have retired from the board of the GENERAL PETROLEUM CO. OF TRINIDAD, LTD., and Messrs. H. M. Gurney, J. Mulcahy and R. Randall-Stevens have been elected directors in their stead.

The Secretary for Mines has appointed Mr. James Pickavance to be a member of the Advisory Committee for the METALLIFEROUS MINING INDUSTRY (under the Mining Industry Act, 1920), as one of the representatives of workers in or about iron ore mines and quarries, in the place of the late Mr. W. Lewney.

After efforts extending over eight years, Mr. J. L. North, curator of the Royal Botanic Gardens, Regent's Park, London, claims to have produced a variety of SOYA BEAN which can be made to flourish in the adverse climate of this country. About 20 acres of plants are said to be under cultivation in and around London.

A number of small PLATINUM CRUCIBLES were stolen from the chemical laboratory at the Arts and Crafts College in Paris on Tuesday. The robbery took place while the staff was away at lunch. As some of the crucibles were in the fire at noon, the thieves must have quenched the crucibles before removing them.

The Council of the Mining Institute of Scotland has agreed that the general meeting of the Institute, to be held at Glasgow to-day (Saturday), should be cancelled. It has been arranged to hold the summer excursion of the members of the Institute on Saturday, August 26, to the Prestwick Collieries of W. Baird and Co., Ltd.

The international meeting for intellectual co-operation concluded its labours at Geneva on Monday. The question of disarmament was brought forward with reference to the manner in which co-operation of the scientists of the world might be enlisted in order to ensure the publication of any DISCOVERIES IN CONNECTION WITH POISON GAS.

According to reports from New York some of the illicit "whiskey" on sale there ranges in quality from genuine whiskey to water, coloured and FLAVOURED WITH IODINE. Among the more poisonous kinds of pseudo-whiskey regularly consumed are unpurified denatured alcohol, which may contain creosote, benzene, kerosene, petroleum, ether, or some other denaturant; wood or methyl alcohol; grain alcohol coloured with burnt sugar.

The Board of Trade have received the report of the Committee appointed, under the chairmanship of Mr. C. A. Russell, to inquire into two separate complaints under Part II. of the Safeguarding of Industries Act relating to GLASS BOTTLES manufactured in Holland and in Germany respectively. The report, which will be published and presented to Parliament, is to the effect that the conditions laid down in Section 2 (1) of the Act are not fulfilled. Consequently, in view of Section 2 (3) of the Act, the Board of Trade are unable to take any further action in respect of the complaints in question.

In exercise of the powers conferred upon them by Section 5 of the Safeguarding of Industries Act, the Board of Trade have directed that CERTIFICATES OF ORIGIN shall be required, so far as concerns the classes or descriptions of goods covered by the Schedule to the Safeguarding of Industries (No. 1) Order, 1922, in the case of goods consigned from all foreign countries in Europe. The necessary instructions have been issued to H.M. Consular Offices in the countries concerned, and the form of certificate of origin prescribed by the Board of Trade can be seen on application to any Customs and Excise Office.

The report of the SOCIÉTÉ DES ACIÉRIES BASSET states that while the chemistry of their steel-making process had entirely fulfilled the claims of the inventor, questions as to the form of the furnaces and their linings had presented great difficulties, mainly on account of the exceptionally high temperature prevailing in the furnace. This temperature made possible the obtaining of a product free from injurious impurities, and although it was technically possible to reduce it, the firm did not desire to discard the advantages which it afforded, and consequently attention had been concentrated on the improvement of the refractory properties of the lining. Efforts in this direction had met with a measure of success, and the progress achieved gave the firm confidence that a satisfactory result would shortly be reached.

According to a United States Consular Report, preparations are being made for the exploitation on a large scale of the POTASH DEPOSITS near Suria, in the Province of Lerida. A Belgian company is now said to be building an extensive plant at Suria, which it is said will have a production capacity more than equal to the total Spanish consumption. To facilitate the transportation of the potash, a railway to Manresa has been constructed, and plans have been completed to extend this line to the port of Barcelona. It is further reported that the product of the Minas de Potasa de Suria is already being placed on the market, and it is thought that Spain will soon cease to import fertilisers of any kind if production in Lerida is increased as expected. It has been estimated that the potash deposits of Central Catalonia contain many millions of tons of this mineral.

The following have been awarded the degree of DOCTOR OF SCIENCE at the University of Manchester:—Mr. A. F. Campbell, for theses on (i.) The influence of the introduction of the methyl group into the phenol molecule; (ii.) The separation of phenol, ortho-, meta-, and para-cresols from crude coal tar and carbolic acids; (iii.) A method for the preparation of β-naphthyl-amine; and seven other papers. Mr. J. N. Greenwood, for theses on (i.) The constitution of copper-aluminium alloys; (ii.) Applications of optical pyrometry in steelworks practice; (iii.) Heat flow of steel during ordinary processes of manufacture; and six other papers. Mr. J. Holker, for a thesis on the periodic opacity of certain colloids in progressively increasing concentration of electrolytes; and twelve other papers. Mr. J. E. Jones, for theses on (i.) The distribution of energy in air surrounding a vibrating body; (ii.) The velocity distribution function of the stresses in a non-uniform rarefied monatomic gas; (iii.) The kinetic theory of electrical conduction in an ionised monatomic gas; and three other papers.

References to Current Literature

British

CATALYSIS.—Catalysis through American spectacles. E. F. Armstrong and T. P. Hilditch. *J.S.C.I.*, July 31, 1922, pp. 304–306 R.

TECHNOLOGY.—Observations on the design and working of ammoniacal liquor stills. P. Parrish. *J.S.C.I.*, July 31, 1922, pp. 229–242 T.

The general problem of evaporation. J. W. Hinchley. *J.S.C.I.*, July 31, 1922, pp. 242–246 T.

THERMO-CHEMISTRY.—The heat developed on mixing sulphuric acid, nitric acid, and water. J. W. McDavid. *J.S.C.I.*, July 31, 1922, pp. 246–250 T.

APPARATUS.—Electric heating and controlling apparatus for a small thermostat. S. O. Rawling. *J.S.C.I.*, July 31, 1922, pp. 250–251 T.

ANALYSIS.—Investigation of Atkinson's process for the estimation of potassium in the presence of sodium, magnesium, sulphates, and phosphates. S. J. Watson. *Analyst*, July, 1922, pp. 285–288.

LEATHER.—Chrome tanning. Part X. Modern methods in chrome tanning. D. Burton. *J. Soc. Leather Trades' Chemists*, July, 1922, pp. 226–234.

A contribution to the method of tannin analysis. J. Schneider. *J. Soc. Leather Trades' Chemists*, July, 1922, pp. 234–239.

Committee on limeyard control. Part V. The analysis of commercial sodium sulphide. W. R. Atkin. *J. Soc. Leather Trades' Chemists*, July, 1922, pp. 239–243.

RUBBER.—Recent developments in the chemistry of rubber. Part II. W. C. Geer. *Rubber Age*, August, 1922, pp. 273–276.

Tests on plantation rubber with zinc oxide and litharge mixings. H. P. Stevens. *Rubber Age*, August, 1922, pp. 280–283.

Difficulties in rubber manufacture. Part IV. The right use of compounding materials. *Rubber Age*, August, 1922, pp. 289–291.

The determination of sulphur in vulcanised rubber. J. W. W. Dyer and A. R. Watson. *J.S.C.I.*, July, 31 1922, pp. 251–252 T.

OILS; FATS.—The theory of polymerisation in fatty oils. A. H. Salway. *J. Oil and Col. Chem. Assoc.*, January, 1922, pp. 16–21.

The theory of polymerisation in fatty oils. R. S. Morrell. *J. Oil and Col. Chem. Assoc.*, January, 1922, pp. 22–24.

Super-centrifugal force and its application to the classification of varnish and the dehydration of oils. A. H. Keable. *J. Oil and Col. Chem. Assoc.*, January, 1922, pp. 2–10.

Studies in the saponification of oils and fats. H. M. Langton. Bibliography. *J. Oil and Col. Chem. Assoc.*, February, 1922, pp. 41–75.

Certain tropical oilseeds. E. R. Bolton and D. G. Hewer. *Analyst*, July, 1922, pp. 282–284.

POWDERS.—The grading of powders by elutriation. T. M. Lowry and L. C. McHatton. *J. Oil and Col. Chem. Assoc.*, March, 1922, pp. 82–91.

Abrasives and polishing powders for glass. J. W. French. *J. Oil and Col. Chem. Assoc.*, March, 1922, pp. 103–110.

United States

WATERPROOFING.—Waterproofing by electricity. I. Ginsberg. *Color Td. J.*, July, 1922, pp. 1–6.

Manufacture of waterproof linen fabrics. J. Schmidt. *Color Td. J.*, July, 1922, pp. 34–36.

DYESTUFFS.—Uses of *p*-toluenesulphonyl chloride in the manufacture of dyes and intermediates. J. Bebie. *Color Td. J.*, July, 1922, pp. 7–8.

PRINTING.—Use of zinc dust in coloured discharge printing. J. M. Matthews. *Color Td. J.*, July, 1922, p. 9.

ELECTRO-CHEMISTRY.—The technology of the carbon electrode industry. Part I. The history of its development. C. L. Mantell. *Chem. and Met. Eng.*, July 19, 1922, pp. 109–112.

Cast iron as produced in the electric furnace and some of its problems. G. K. Elliott. *Chem. and Met. Eng.*, July 19, 1922, pp. 116–119.

GENERAL.—The business side of chemical manufacturing. Part V. C. Wadsworth. *Chem. and Met. Eng.*, July 19, 1922, pp. 101–104.

ACIDS.—Concentrating dilute nitric acid solutions. C. D. Carpenter and J. Babor. *Chem. and Met. Eng.*, July 19, 1922, pp. 121–124.

French

FATS.—The manufacture of edible fats. H. Blin. *Les Matières Grasses*, July 15, 1922, pp. 6174–6177.

ALCOHOL.—Alcohol from sulphite cellulose. H. du Boistesselin. *Monit. Scient.*, May, 1922, pp. 97–105.

ACIDS.—Study of aromatic sulphinic acids. B. M. Rivetti. *Rev. Textile*, June, 1922, pp. 799–801.

DYESTUFFS.—Dyes derived from sulphobenzide. B. M. Rivetti. *Rev. Textile*, May, 1922, pp. 663–669.

Some new derivatives of sulphobenzide. E. Grandmougin. *Rev. Textile*, May, 1922, p. 671.

Note on the tetraoxyanthraquinones. E. Grandmougin. *Rev. Textile*, June, 1922, pp. 814–815.

German

OILS.—The drying of fatty oils. P. Slansky. *Z. angew Chem.*, July 28, 1922, pp. 389–391.

ACIDS.—The acids of uranium, tungsten and molybdenum. G. F. Hüttig. *Z. angew. Chem.*, July 28, 1922, pp. 391–392.

PHOSPHATES.—The phosphate question in present-day world economics. P. Krische. *Z. angew. Chem.*, July 18, 1922, pp. 369–372.

The manufacture of double superphosphates and the preparation of sodium phosphate. Part II. H. Voss. *Chem.-Zeit.*, July 6, 1922, pp. 606–609.

ANALYSIS.—The colorimetric estimation of vanadium in steel. A. Kropf. *Z. angew. Chem.*, July 14, 1922, pp. 366–367.

Estimation of silver and halogen in photographic preparations. E. Lehmann. *Z. angew. Chem.*, July 18, 1922, pp. 373–374.

SODA.—Method for the production of soda and sulphuretted hydrogen from sulphate and coal. J. Michler. *Chem.-Zeit.*, July 15, 1922, pp. 633–634.

WAXES.—The acids of Montan wax. Part III. H. Tropsch and A. Kreutzer. *Brennstoff-Chem.*, July 15, 1922, pp. 212–215.

PROTEINS.—Natural proteins. Part I. Behaviour of chlorine peroxide towards organic compounds. E. Schmidt and K. Braunsdorf. *Ber.*, June 17, 1922, pp. 1529–1534.

METHYLENE COMPOUNDS.—Hexamethylene-imine and its behaviour on oxidation. F. Schmidt. *Ber.*, June 17, 1922, pp. 1584–1591.

Benzo-polymethylene compounds. Part III. Dehydrogenation experiments with tetralin, hydrindene and tetrahydro-acenaphthene derivatives. J. v. Braun, E. Hahn, and J. Seemann. *Ber.*, June 17, 1922, pp. 1687–1700.

Benzo-polymethylene compounds. Part IV. The two *ar*-aldehydes of tetralin. J. v. Braun. *Ber.*, June 17, 1922, pp. 1700–1709.

Benzo-polymethylene compounds. Part V. Synthesia of α-anthrapyridine from tetralin. J. v. Braun and H. Gruber. *Ber.*, June 17, 1922, pp. 1710–1717.

Miscellaneous

OXIDATION.—The oxidation of aliphatic hydrocarbons with nitrogen dioxide. Part II. C. Gränacher and P. Schaufelberger. *Helv. Chim. Acta*, May 2, 1922, pp. 392–395.

TERPENES.—Higher terpene compounds. Part II. Abietic acid. L. Ruzicka and J. Meyer. *Helv. Chim. Acta*, May 2, 1922, pp. 315–344.

Higher terpene compounds. Part III. The naphthalene hydrocarbons cadalin and eudalin, two aromatic parent materials of the sesquiterpene series. L. Ruzicka, J. Meyer and M. Mingazzini. *Helv. Chim. Acta*, May 2, 1922, pp. 345–368.

Higher terpene compounds. Part IV. Synthesis of cadalin. L. Ruzicka and C. F. Seidel. *Helv. Chim. Acta*, May 2, 1922, pp. 369–375.

NITRO COMPOUNDS.—Nitro derivatives of *p*-phenetidine. F. Reverdin and H. P. A. Roethlisberger. *Helv. Chim. Acta*, May 2, 1922, pp. 300–314.

Patent Literature

Abstracts of Complete Specifications

182,497. Resins and Oil-Soluble Dyestuffs. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, London, S.W.1. Application date, January 7, 1921.

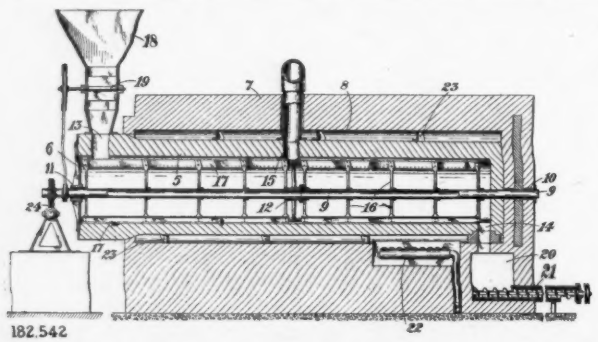
These resins are produced by incorporating a di-azo compound with a synthetic resin, preferably before completing the condensation. The resins used are those obtained by condensation or polymerisation of phenols and aldehydes, or ketones and aldehydes. In an example, the resin is composed of crystallised phenol 94 parts, hexamethylene-tetramine 7·5 parts, and diazotised *p*-nitraniline 15 parts. The mixture is melted, yielding an orange-coloured resin which dissolves in oils and fats, yielding an orange solution. The phenol may be replaced by monohydroxy or polyhydroxy homologues, or by chlorinated phenols, the latter yielding a greenish resin. Another example is given using a synthetic resin composed of formaldehyde and acetone. The products may be used as fat or oil-soluble varnishes for paper, textile fabrics, leather, wood or metals, or as an electrical insulator.

182,539. Magnetic Separators. S. Percival, London. (From L. B. Woodworth, S. T. Tregaskis, The Central Mining and Investment Corporation, Ltd., and The Transvaal Consolidated Land and Exploration Co., Ltd., The Corner House, Commissioner Street, Johannesburg.) Application date, March 31, 1921.

The apparatus is of the kind in which the material to be separated is carried by a main conveyor belt through separating zones in a magnetic field, and the separated material is removed by transverse or cross belts by which it is carried out of the magnetic field into a receiver. The speed of the main belt and the transverse belts may be varied, and the magnetic field may also be varied to separate various constituents of the material. In this invention, two pairs of main magnetic poles are provided, and an auxiliary pole is attached to one of the main poles, and has a separate energising coil. A third magnetic field is thus obtained for the separation of magnetic substances of varying permeabilities.

182,542. Carbonising Furnaces or Retorts. L. H. Bonnard, 12, Kent Gardens, Ealing, W. Application date, March 31, 1921.

A retort for the destructive distillation or carbonisation of carbonaceous material such as sawdust comprises a horizontal cylinder 5 of fireclay mounted in a setting 7 and heated by a series of burners 22 adapted for fuel oil, pulverised coal, producer gas, etc. Helical baffles 23 are provided in the flue 8 to cause the hot gases to circulate around the retort. The



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central shaft 9 is rotated by gearing 24 and carries a series of radial arms 16 having longitudinal blades 17 close to the inner walls of the retort. The blades may be parallel to the axis of the shaft, or may be slightly helical. The mixture of sawdust and calcium carbonate is fed by a rotary feed regulator 19 to the retort, and a gas outlet is provided at 15. The carbonised product passes to a cooling chamber 20 and is withdrawn by a conveyor 21. The temperature at the discharge end of the retort may be 1,000°–1,100° C., and gradually diminishes to 450°–500° C. at the inlet end. This retort provides for the uniform heating of the material. Reference is directed in pursuance of Section 7, sub-section 4 of the Patents and Designs Acts, 1907 and 1919, to Specifications Nos. 9,550/1886, 19,310/1896, 106,084 and 106,636.

182,601. Carbonaceous Materials, Apparatus for the Distillation of. P. M. Salerni, 35, New Broad Street, London. Application date, April 25, 1921.

The apparatus is for the low-temperature distillation of carbonaceous material to recover hydrocarbon oils. Retorts of this kind are sometimes provided with an internal screw conveyor to agitate the material and convey it through the retort. When such a conveyor is rotated sufficiently rapidly to agitate the material, the rate of conveyance through the retort may be too rapid, so that the whole of the volatile constituents are not driven off before the material leaves the retort. If this difficulty is avoided by a slower rotation, the material may not be sufficiently agitated. In the present invention the stirring device comprises a horizontal shaft carrying a number of radial arms along its length which are out of line with one another. These radial arms are provided with small blades at their outer extremities to remove any adherent material from the retort wall, and these blades may be slightly inclined to give a slight propelling action to the material at the periphery of the retort. A constant level is maintained in the retort by an overflow plate at the outlet end, so that the rate of conveyance through the retort depends on the rate of supply of material. The charge may therefore be retained in the retort for any desired time to effect the required distillation.

182,609. Aluminium Oxide, Process of Producing. L. Burgess, 152, Avenue B, Bayonne, N.J., U.S.A. Application date, April 27, 1921.

The process is for reducing aluminium oxide, either pure or associated with other substances. The aluminium oxide is reduced with carbon in an electric arc, and it is found that it is necessary for the reaction to take place at a temperature higher than that at which aluminium oxide volatilises. This condition cannot be obtained by passing the current through a mechanical mixture of aluminium oxide and carbon without a separate resistance element or an arc, since the boiling point of aluminium oxide limits the maximum temperature obtainable. If the reduction is attempted in a reduction furnace, the aluminium oxide is fused before reduction can take place, and separates from its mixture with the carbon. Further, if an arc furnace is used a shell of high electrical conductivity is formed around the reaction zone, so that the arc changes its position and is formed between the edge of the shell and the side of the electrode. In this case the yield obtained is small. In the present invention an intimate mixture of aluminium oxide and carbon is formed into a mass in which the aluminium oxide is encased in a matrix composed of carbon or carbonaceous material, and the charge is then subjected to an arc within it. When a charge consisting of pure oxide of aluminium and the theoretical amount of carbon is used, it is possible to obtain aluminium carbide containing a small percentage of metallic aluminium. If an excess of carbon is used, the aluminium is eliminated, and with less carbon the proportion of aluminium is increased. The charge is prepared by mixing the finely divided aluminium oxide with the necessary amount of pitch, preferably in a steam-jacketed mechanical mixer, and then heating the mixture slowly to a red heat in a reducing atmosphere until coked. Other binding materials may be used, such as coal-tar pitch, petroleum pitch, oxidised asphalt, starch, sugar, soft coal or the like, with or without free carbon. A suitable mixture consists of aluminium oxide 650 parts, and oxidised petroleum pitch having a melting point of 265°F. 500 parts. The furnace used must be one which produces a closed arc and has one or more depending adjustable vertical electrodes. When using single-phase currents, a horizontal lower electrode is employed, or the lower electrode may be embedded in carbon forming the bottom of the furnace. When using the furnace, the

vertical electrode is lowered until it touches the horizontal electrode, and the charge is placed in the furnace until it covers and encloses the arc. An alternating current at 60 volts is used, and is gradually raised to 110 volts. The current is approximately the ampère capacity of the electrodes. The vertical electrode is gradually raised to maintain a gap between the bottom of the electrode and the reduced material sufficient to hold the current at the desired point. An electric furnace with three vertical electrodes for polyphase currents may also be used.

182,661. Caustic Soda, Manufacture and Production of. Courtaulds, Ltd., 19, Aldermanbury, London, and R. O. Jones, 21, Hoveden Road, Cricklewood, Middlesex. Application date, June 11, 1921.

In the preparation of caustic soda from sodium carbonate and lime, the fact that the reaction is a reversible one renders it difficult to produce solutions of a strength above 8 per cent. According to this invention solutions of caustic soda up to 20 per cent. strength may be obtained. In the usual process, any further addition of sodium carbonate, after the concentration of the caustic soda reaches the limit, is precipitated in the form of an insoluble double carbonate of calcium and sodium. If the calcium carbonate precipitated up to this point be removed from the solution, an additional quantity of sodium carbonate and lime may be added with a further production of caustic soda together with the insoluble double carbonate. The first stage of the reaction is represented by the equation :—

$$Ca(OH)_2+Na_2CO_3=2NaOH+CaCO_3$$

and the second stage by the equation :—

$$Ca(OH)_2+2Na_2CO_3+xH_2O=2NaOH+Na_2CO_3.CaCO_3xH_2O$$

The concentration of the liquor in the first stage is sufficiently low to prevent any precipitation of the double carbonate, and that which is precipitated in the second stage is filtered and decomposed with water to yield a solution of sodium carbonate, which may be used again in the process. In an example, a solution of 66 parts of sodium carbonate in 200 parts of water is heated to 90° C. and 30 parts of quicklime added gradually, the temperature being maintained. The solution is boiled for one hour, the volume being maintained constant, and the solution then contains about 14·5 per cent. of caustic soda and 7·8 per cent. of sodium carbonate. The calcium carbonate is filtered off, and the liquor treated with 12 per cent. of sodium carbonate and 4 per cent. of quicklime. A solution containing 19–20 per cent. caustic soda and 5–6 per cent. sodium carbonate is obtained.

182,679. Electrodes in Apparatus for Electrolysing Fused Materials, Arrangement and Construction of. T. Kolkin, Vadheim in Sogn, Norway. Application date, June 27, 1921.

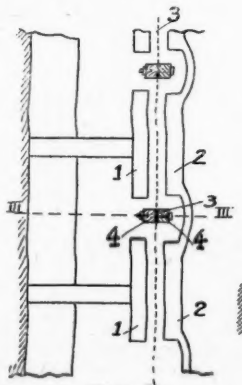


Fig.1.

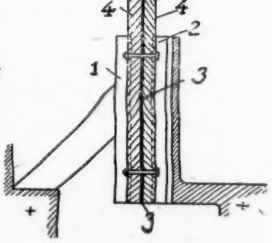


Fig.2.

182,679

In an electrolytic cell such as that used for producing metallic sodium from fused caustic soda it has been found difficult to obtain a durable diaphragm or gauze netting between the electrodes, and to obtain a high current density from the surfaces of smooth electrodes. In this invention, shown in sectional plan and elevation in Figs. 1 and 2, the anodes 1 are separated from the cathode 2 by a wire gauze diaphragm 3. The anodes are separated from one another, but the cathode is continuous and is provided with grooves opposite the gaps between the anodes. The diaphragm 3 is supported at intervals by vertical clamping bars 4, which are arranged at the gaps between the anodes, one on each side of the gauze 3. One of each pair of bars 4 is attached to a horizontal supporting bar 5. In a modification, the anode is formed of a single member having grooves similar to and opposite to those of the cathode, and in another modification the cathode as well as the anode is formed of separated portions.

182,693. Lead Chromate Pigments, Manufacture of. H. Hetherington and W. A. Allsebrook, High Tor Works, Matlock Bath, Derbyshire. Application date, July 13, 1921.

Precipitated lead sulphate is treated with the equivalent quantity of a soluble normal chromate of an alkali or ammonium to obtain the normal lead chromate known as pure middle chrome. Paler chrome yellows may be obtained by treating the lead sulphate with less than the equivalent quantity of lead chromate, so that the lead chromate is mixed with some unaltered lead sulphate.

182,696. Colloids and Colloidal Solutions, Process for Preparing. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, London, S.W.1. (From H. Plauson, 14, Huxter, Hamburg, Germany.) Application date, July 15, 1921.

In preparing a colloid by the condensation method, the particles of colloidal dimensions are formed from a solution by the union of a number of molecules, but it is frequently difficult to stop this condensation when the particles are within the limits of colloidal size—*i.e.*, from 0·001 mm. to 0·00001 mm. It has been found that the further condensation of the molecules can be prevented if the mixture of liquid and solid is subjected to intensive mechanical disintegration. This method of combined precipitation and colloidalisation which is described in Specification No. 155,836 (see The Chemical Age, Vol. IV., p. 313) is found to be particularly suitable for preparing colloidal solutions of elements such as silver, gold, mercury, platinum, palladium, lead, sulphur, selenium, arsenic. In an example, a mixture of a 1 per cent. solution of silver nitrate 169 parts and a 10 per cent. solution of ammonia 3·4 parts is treated in a colloid mill with three parts of agar-agar and 30 parts of 1 per cent. formaldehyde solution. A deep brown colloidal solution of silver is obtained which may be rendered more permanent and concentrated by ultra filtration at high pressure as described in Specification No. 155,834 (see The Chemical Age, Vol. IV., p. 313). The ammonium nitrate is removed by dialysis.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—155,776 (M. Brutzkus) relating to effecting chemical reactions in the interior of compressors, see Vol. IV., p. 286 ; 156,095 (Koln-Rottweil Akt.-Ges.) relating to manufacture of cellulose, see Vol. IV., p. 313 ; 159,878 (Norsk Hydro-Elektrisk Kvaelstofaktieselskab), relating to manufacture of ammonia, see Vol. IV., p. 567 ; 160,811 (Soc. Anon pour l'Etude et l'Exploitation des Procédés G. Claude), relating to synthesis of ammonia, see Vol. IV., p. 627 ; 163,011 (Firm of Bismarckhütte), relating to separating water from coal tar, see Vol. V., p. 46 ; 165,083 (F. Bayer & Co.), relating to copper compounds of substantive azo-dyestuffs, see Vol. V., p. 216 ; 172,937 (Barrett Co.), relating to purification of naphthalene, see Vol. VI., p. 209.

International Specifications not yet Accepted

181,009. Dyes and Intermediates. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, May 31, 1921. Addition to 172,177 (see The Chemical Age, Vol. VI., p. 15).

The reaction between α-naphthol and carbon tetra halides described in Specification 172,177 is carried out in the presence of an aliphatic alcohol. Esters of 1-oxynaphthalene-4-

carboxylic acid, 1-oxynaphthalene-2 : 4-dicarboxylic acid, or 4 : 4^1-dioxy-1 : 1^1-dinaphthylketone are obtained and are separated by organic solvents, acids or bases. Methyl alcohol yields the esters of the two carboxylic acids, ethyl alcohol yields the ester of 1-oxynaphthalene-4-carboxylic acid and the dioxydinaphthylketone, and amyl alcohol yields the dioxydinaphthylketone.

181,014. CONDENSATION PRODUCTS. F. Pollak, 20, Langegasse, Vienna. (Assignee of K. Ripper, 6, Bleichergasse Vienna.) International Convention date, May 31, 1921.

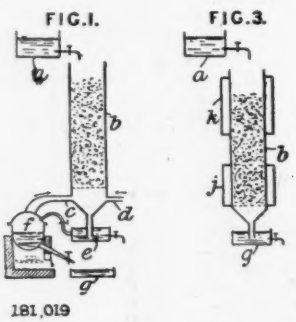
The initial water-soluble condensation products from aldehydes and urea, thiourea, or their derivatives may be prevented or retarded from hardening by adding salts of weak acids, such as alkali or alkaline earth salts of organic carboxylic acids or weak organic acids. Hardening may be accelerated by adding salts of strong acids such as sulphates, chlorates, chlorides or nitrates, also ammonium sulphocyanate and other ammonium salts. Hardening takes place in any case when the condensation product is subjected to heat treatment. In an example, a condensation product formed from urea, formaldehyde, and hexamethylene tetramine may be rendered permanently liquid by the addition of sodium acetate or borax. A transparent solid may be produced by adding ammonium sulphocyanate, potassium sulphate, nitrate, chloride, chlorate, iodide, or sulphocyanate, or by evaporating *in vacuo*.

181,016. FILTERING. G. Nafilyan, Compagne de Villamont, Lausanne, Switzerland. International Convention date, June 1, 1921.

A mixture may be filtered by converting it into a mist or spray and passing it through a passage separated from a surrounding chamber by fabric partitions. The solid particles are gradually collected in the outer chamber.

181,019. SULPHUR, EXTRACTING FROM GASES. A. A. L. J. Damiens, 167, Route d'Orleans, Arcueil-Cachan, Seine, France, M. C. J. E. de Loisy, 64, Rue La Boëtie, Paris, and O. J. G. Piette, 101, Avenue de la Toison d'Or, Brussels. International Convention date, June 3, 1921.

The invention comprises a cyclic process for extracting sulphur from gases containing sulphuretted hydrogen, such as coke oven gas, illuminating gas, or producer gas. An acid solution of ferric sulphate or perchloride is used for precipitating the sulphur with a reduction to the ferrous salt, which is oxidised by means of nitrous or nitric acid and used again. The sulphur is removed, and the liquor is passed from a tank *a* to a column *b*, packed with coke. A mixture of nitric oxide



and air passes upwards through the column from the inlets *c*, *d*, and the liquor passes downwards through the column to a receiver *e* and thence to a still *f*. On heating the latter, the ferrous salt is oxidised and nitric oxide is liberated. The nitric oxide is oxidised by air to nitrogen peroxide and returned to the column *b*. In an alternative apparatus, the heating of the ferrous salt with nitrogen peroxide is effected in the lower part of the column by a jacket *j*, while a cooling jacket *k* is provided on the upper part. If the proportion of sulphuretted hydrogen in the gases is small, it may be precipitated by means of zinc sulphate or acetate, regenerated in the usual way, and then subjected to the above process.

LATEST NOTIFICATIONS.

183,806. Dyeing of cellulose acetate. Soc. Chemique des Usines du Rhone. July 27, 1921.
183,813. Process of dyeing or printing textile fabrics and other materials in fast colours. Geigy, Soc. Anon. J.R. July 29, 1921.
183,823. Obtaining mineral oils from bituminous rocks. Kern, L. July 27, 1921.
183,825. Process and plant for the extraction of fatty and other matters by means of volatile solvents. Zipser, S. July 27, 1921.
183,830. Phenolic condensation products and manufacture thereof. Shawinigan Laboratories, Ltd. July 25, 1921.
183,837. Manufacture of soap. Lijdam, B.J.A. August 1, 1921.

Specifications Accepted, with Date of Application

156,698. Ammonia, Synthesis from its elements and catalyst therefor. Nitrogen Corporation. Jan. 7, 1920.
159,461. Phenols and Aldehydes, Manufacture of Condensation Products from. Bakelite-Ges. and R. Hessen. March 1, 1920.
163,030. Sulphuric Acid, Manufacture of. G. Mirat and P. Pipereaut. May 6, 1920.
163,980. Formaldehyde, Manufacture of. Barrett Co. May 26, 1920.
169,950. Ores, Process of Reducing. Trent Process Corporation. October 4, 1920.
170,264. Liquid Hydrocarbons from Fish Oils. Process of Manufacturing. K. Kobayashi. October 13, 1920.
171,075. Oils, Distillation of. Trent Process Corporation. November 4, 1920.
171,078. Dyeing, Manufacture of stable, dry, and readily-soluble vat preparations for. Farbwerke vorm. Meister, Lucius, and Bruning. November 1, 1920.
174,040. Carbon disulphide, Process for producing from its elements. Chemische Fabrik Griesheim Elektron. Jan. 14, 1921.
183,160. Gas-producers, Apparatus for use in cooling, cleansing, or scrubbing gases in connection with all types of. O. B. Davies. January 19, 1921.
183,180. Peat and the like, Treatment of. Thermal Industrial and Chemical (T.I.C.) Research Co., Ltd., and J. S. Morgan. March 12, 1921.
183,217. Silicon steel and other metals and alloys, Methods of refining. British Thomson-Houston Co., Ltd. (*General Electric Co.*) April 15, 1921.
183,219. Gas-producers, electric, furnaces, crucible furnaces and the like. Ferolite, Ltd., and H. B. Clapp. April 15, 1921.
183,243. Alkaline earth carbonates, Process for grading. W. W. Plowman and W. Feldenheimer. April 19, 1921.
183,254. Vulcanising, Process and apparatus for. H. Jäggi-Zumbühl. April 21, 1921.
183,323. Red oxide of iron, Manufacture of. D. Tyrer. June 8, 1921.
183,348. Hydrocyanic acid, Method of producing. H. G. C. Fairweather. (*Air Reduction Co., Inc.*) July 6, 1921.
183,351. Benzanthrone derivatives, Manufacture of. British Dyestuffs Corporation, Ltd., A. G. Perkin and G. D. Spencer. July 12, 1921.

Applications for Patents

Atack, F. W., and Thompson, A. Processes of manufacturing carbazol derivatives. 21318. August 4.
Atack, F. W., and Thompson, A. Process of purifying anthraquinone or its derivatives. 21319. August 4.
Badische Anilin- und Soda-Fabrik. Process for production of a blue vat dye-stuff of the anthracene series. 21366. August 4. (Germany, August 4, 1921.)
Calder, W. A. S., Chance and Hunt, Ltd., and Balmer, G. E. Process for condensing acid fumes evolved during concentration of sulphuric acid. 21012. August 1.
Codd, L. W. Production of alkali silicate solutions. 21436. August 5.
Davies, A. H., Scottish Dyes, Ltd., Thomas, E. K., and Thompson, H. Production of colouring matters. 21276. August 3.
Erdöl-und Kohle-Verwertung Akt.-Ges., and Erlenbach, E. Process for catalytic cracking of hydrocarbon oils, tars, etc. 21048. August 1.
Fonblanque, L. de, and Moeller, F. Method of treating peat, etc. 21062. August 2.
Fonblanque, L. de, and Moeller, F. Treatment of peat. 21462. August 5.
Illingworth, S. R. Treatment of shale, coal, etc., for removal of sulphur. 21011. August 1.
Legeler, —. Process for manufacture of sulphur proto-chloride. 21401. August 4. (Germany, December 29, 1921.)
Moeller, F. Waterproofing cellulose or carbo-hydrates of the cellulose group. 21049. August 1. (Germany, August 12, 1921.)
Perry, W. P. Apparatus for distilling carbonaceous material. 21010. August 1.
Texas Gulf Sulphur Co., Inc. Burning sulphur. 21261. August 3. (United States, January 21.)

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, AUGUST 10, 1922.

THE chemical trade is only just beginning to recover from the effects of the holiday at the time of writing, so that we have relatively very little to report. The demand still maintains its improved tendency, and the outlook is brighter.

Export trade has only been moderate, the violent fluctuations in exchanges tending to restrict business to the minimum.

General Chemicals

ACETONE maintains its firmer tendency and stocks are light.

ACID ACETIC is very firm.

ACID CITRIC lacks interest, but makers adhere to their quotations.

ACID FORMIC continues moderately active.

ACID LACTIC is a quiet market, and the price is without change.

ACID OXALIC has been interesting, and a fair business has been done at last quoted figures.

ACID TARTARIC is a shade easier, but is expected to recover with any improvement in the demand.

BARIUM CHLORIDE continues as scarce as ever, and high prices are paid for near delivery.

CREAM OF TARTAR is a shade easier, but this is thought to be only temporary.

IRON SULPHATE is only moderately active.

LEAD ACETATE has again advanced, and the demand is steady.

LEAD NITRATE continues quietly steady.

LITHOPONE is in fair request at last quoted figures.

POTASSIUM CARBONATE is in small request.

POTASSIUM CAUSTIC still continues easy with a small demand.

POTASSIUM PRUSSIATE is practically unobtainable on the spot, and the price is rather firmer.

SODIUM ACETATE is in good request and the price is without change.

SODIUM NITRATE business has been on a larger scale than recently; the price, however, is without change.

SODIUM PHOSPHATE is in small request at unchanged figures.

SODIUM PRUSSIATE is extremely scarce and high prices are paid for near delivery.

WHITE LEAD has been a fair market at the advanced price.

ZINC OXIDE is very firm and relatively scarce for near delivery.

Coal Tar Intermediates

Home trade during the past week has been slightly more interesting, while the export market is decidedly better.

ALPHA NAPHTHOL is firmer in price, with no very large stocks available.

ALPHA NAPHTHYLAMINE is quiet, with the price unchanged.

ANILINE OIL AND SALT has been inquired for on export account, and the prices remain steady.

BENZALDEHYDE is without special feature.

BENZIDINE BASE is firm, with home orders in the market.

BETA NAPHTHOL is steady, and fairly large stocks are available.

BETA NAPHTHYLAMINE a fair business has been done.

DIMETHYLANILINE is without special feature.

DIPHENYLAMINE still remains firm, with stocks available.

"H" ACID is firm, with home orders in the market.

NITROBENZOL is firm, with some home inquiries.

PARANITRANILINE still remains firm, and good business has been completed.

RESORCIN is firm, with small stocks available.

Coal Tar Products

The market generally maintains a fairly firm tone for most coal tar products.

90's BENZOL is firm at 2s. on rails.

PURE BENZOL.—There is a poor demand, and it is worth about 2s. 4d. per gallon on rails.

CREOSOTE OIL remains very firm and is somewhat scarce for prompt delivery. It is worth about 5¾d. per gallon in the North and 6¼d. per gallon in the South.

CRESYLIC ACID is also fairly steady, but there is not very much fresh business doing. Its value is about 2s. 3d. to 2s. 4d. per gallon on rails, for the pale quality 97–99 per cent, and the dark quality is worth from 1s. 10d. to 2s.

SOLVENT NAPHTHA maintains its better tone and is worth from 1s. 8d. to 1s. 9d. on rails.

HEAVY NAPHTHA there is a poor demand and it is not worth more than 1s. 7d. to 1s. 8d. on rails.

NAPHTHALENE shows no change and there is little inquiry—it is worth from £4 10s. to £5 per ton for the crude qualities, while refined is worth from £16 to £20 per ton.

PITCH remains firm, and prices still have an upward tendency.

Sulphate of Ammonia

The position is unchanged.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	8	to	0	1	10
Acetone oil	ton	77	10	0	to	80	0	0
Acetone, pure	ton	77	10	0	to	80	0	0
Acid, Acetic, glacial, 99–100%	ton	67	0	0	to	68	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic, liquid, 2000 s.g.	ton	67	0	0	to	70	0	0
Boric, cryst.	ton	60	0	0	to	65	0	0
Carbolic, cryst. 39–40%	lb.	0	0	6	to	0	0	6½
Citric	lb.	0	2	3	to	0	2	4
Formic, 80%	ton	65	0	0	to	66	0	0
Gallic, pure	lb.	0	2	11	to	0	3	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	40	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	30	0	0	to	31	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	38	0	0	to	40	0	0
Pyrogallic, cryst.	lb	0	6	0	to	0	6	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.	lb.	0	1	5	to	0	1	6
Sulphuric, 92–93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	5	to	0	1	5½
Alum, lump	ton	10	0	0	to	10	10	0
Alum, chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14–15%	ton	10	10	0	to	11	0	0
Aluminium, sulphate, 17–18%	ton	11	10	0	to	12	0	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	9
Ammonia, .880	ton	33	0	0	to	35	0	0
Ammonia, .920	ton	21	0	0	to	23	0	0
Ammonia, carbonate	lb.	0	0	4	to	0	0	4½
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure)	ton	35	0	0	to	40	0	0
Ammonia, phosphate	ton	74	0	0	to	75	0	0
Ammonia, sulphocyanide	lb.	0	1	10	to	0	2	0
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92–94%	ton	12	10	0	to	13	0	0
Barium, Chlorate	ton	60	0	0	to	68	0	0
Barium Chloride	ton	23	0	0	to	23	10	0
Nitrate	ton	27	10	0	to	30	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	3
Bleaching powder, 35–37%	ton	12	0	0	to		—	
Borax crystals	ton	29	0	0	to	33	0	0
Caffein	lb.	0	13	0	to	0	14	0
Calcium acetate, Brown	ton	9	0	0	to	9	10	0
" " Grey	ton	13	10	0	to	14	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	10	0	to	7	0	0
Carbon bisulphide	ton	50	0	0	to	52	0	0
Casein, technical	ton	47	0	0	to	55	0	0
Cerium oxalate	lb.	0	4	6	to	0	4	9
Chromium acetate	lb.	0	1	1	to	0	1	3

	Per	£	s.	d.		£	s.	d.
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98–100%	ton	115	0	0	to	117	10	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	68	10	0	to	70	0	0
Formusol (Rongalite)	lb.	0	2	6	to	0	2	9
Glauber salts, commercial	ton	5	10	0	to	6	0	0
Glycerine, crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	5	to	0	2	6
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	41	0	0	to	42	0	0
Carbonate (White Lead)	ton	43	0	0	to	47	0	0
Nitrate	ton	46	10	0	to	48	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	23	10	0	to	24	0	0
Magnesium chloride	ton	10	0	0	to	10	10	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	8	0	0	to	8	10	0
Sulphate (Druggists')	ton	13	10	0	to	14	10	0
Manganese, Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	60	0	0	to	62	0	0
Methyl acetone	ton	60	0	0	to	65	0	0
Alcohol, 1% acetone	ton	65	10	0	to	66	0	0
Nickel sulphate, single salt	ton	49	0	0	to	51	0	0
Ammonium sulphate, double salt	ton	51	0	0	to	52	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	6¼	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride, 80%	ton	12	0	0	to	12	10	0
Chlorate	lb.	0	0	4½	to	0	0	5
Metabisulphite, 50–52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	4	6	to	0	4	9
Prussiate, yellow	lb.	0	1	7½	to	0	1	8½
Sulphate, 90%	ton	13	0	0	to	13	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	24	10	0	to	24	15	0
Arseniate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5½	to		—	
Bisulphite, 60–62%	ton	23	0	0	to	24	0	0
Chlorate	lb.	0	0	3½	to	0	0	4
Caustic, 70%	ton	20	10	0	to	21	0	0
Caustic, 76%	ton	21	10	0	to	22	10	0
Hydrosulphite, powder, 85%	lb.	0	1	9	to	0	2	0
Hyposulphite, commercial	ton	13	10	0	to	14	0	0
Nitrite, 96–98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	18	10	0	to	19	0	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	11½	to	0	1	0
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60–62%	ton	21	10	0	to	23	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	55	0	0	to	60	0	0
Strontium Nitrate	ton	50	0	0	to	55	0	0
Strontium Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Theobromine	lb.	0	14	0	to	0	14	6
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride 102° Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	36	0	0	to	38	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	3	0	to	0	3	3
Alphanaphthylamine	lb.	0	2	0	to	0	2	1
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	9	to	0	6	0
Benzidine, sulphate	lb.	0	5	9	to	0	6	0
Benzoic acid	lb.	0	1	9	to	0	2	0
Benzoate of soda	lb.	0	1	7½	to	0	1	9
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0½
Betanaphthol	lb.	0	1	4	to	0	1	4½
Betanaphthylamine, technical	lb.	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	3	to	0	2	6
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6½
Metatoluylenediamine	lb.	0	4	6	to	0	4	9
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	0	to	0	3	3
Naphthionate of Soda	lb.	0	3	0	to	0	3	3
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	9	to	0	8	0½
Nitrobenzol	lb.	0	0	9	to	0	0	9½
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	10	6	to	0	10	9
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	0	to	0	7	3
Salol	lb.	0	2	0	to	0	2	3
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

British-Made Gas Mantles

Operation of the Safeguarding of Industries Act

PRESIDING at the eleventh annual general meeting of the Welsbach Light Co., Ltd., held on August 4, at Winchester House, London, Mr. J. R. Yates said that having regard to the results of industrial concerns throughout the country, with their almost unbroken series of depreciation and loss, and to the fact that, apart from the general trade slump, the company had had to battle against insidious and unfair competition, aided by currency conditions amounting to a huge bounty on competing foreign goods, he trusted that the showing now made might not be unfavourably regarded. After dealing with the proceedings in relation to the Safeguarding of Industries Act, the chairman said that the position now was that all mantles coming from abroad were taxed at the rate of 33⅓ per cent. upon the value of the dutiable ingredients as such, and that the application to impose a further duty upon gas mantles coming from Germany was still awaiting a report of the Board of Trade Committee. If the result of this application should be favourable, the duty would be 33⅓ per cent. upon the whole value of the mantle.

He next referred to special measures which had been adopted to meet a position which he said was one of unusual difficulty, and stated that, in common with other British mantle manufacturers, the Welsbach company had offered a rebate bonus to be credited at the end of the season to those of their customers who undertook to buy and sell throughout the season British-made mantles exclusively. Large numbers of dealers had accepted this scheme and given their undertaking to deal exclusively in British-made mantles. Experiments had been constantly carried on to improve the manufacture and durability of mantles for high pressure lighting, and the company was working in the closest touch with the Trinity House engineers in developing improvements in lighthouse and similar equipment. He added that theirs was the only company which manufactured mantles for use in British lighthouses.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, August 9, 1922.

BUSINESS during the past week has been fairly satisfactory; numerous inquiries have been received, and actual business booked is proportionately good.

Continental quotations, owing to the further fall in German currency value, are cheaper, but the likelihood of delivery to contract time is doubtful.

Industrial Chemicals

ACID ACETIC.—Glacial 98/100 per cent., £56 to £58 per ton; 80 per cent. technical, £38 to £39; 80 per cent. pure £43 to £44 per ton. Good inquiry for export.

ACID BORACIC.—Price unchanged. Crystal or granulated, £60 per ton; powdered, £62 per ton.

ACID FORMIC, 80 PER CENT.—Quoted £66 per ton.

ACID HYDROCHLORIC.—Makers' price unchanged. 6s. 6d. per carboy ex works.

ACID OXALIC.—On offer at 8d. per lb. spot delivery.

ACID SULPHURIC.—144°, £4 per ton; 168°, £7 5s. per ton; de-arsenicated quality £1 per ton more.

ACID TARTARIC.—Quoted 1s. 4½d. per lb. delivered.

ALUM, LUMP POTASH.—Spot lots on offer at £14 10s. to £15 per ton, ex store.

ALUMINA SULPHATE.—Cheap Continental offers of £7 15s. per ton, for 14/15 per cent.; £8 15s. per ton for 17/18 per cent., c.i.f. U.K.

AMMONIA CARBONATE.—Lump, 4d. per lb.; powdered, 4¼d. per lb. delivered

AMMONIA, LIQUID, 880°.—About 3d. per lb., ex works.

AMMONIA MURIATE.—Galvanisers, grey £34 to £35 per ton; fine white on offer at £29 per ton, c.i.f.

AMMONIA SULPHATE.—25¼ per cent., £14 10s. per ton; 25¾ per cent. neutral, £15 13s. per ton, ex works.

ARSENIC, WHITE POWDERED.—Moderate inquiry. £45 to £46 per ton, ex quay.

BARIUM CARBONATE, 98/99 PER CENT.—On offer at £13 per ton, c.i.f.

BARIUM CHLORIDE, 98/100 PER CENT.—Price for English make, £22 per ton. Continental, £19 10s., c.i.f. U.K.

BARYTES, FINEST WHITE.—English, £5 5s. per ton, ex works.

BLEACHING POWDER.—Spot lots, £12 15s. per ton, ex station.

BORAX.—Price for crystal or granulated, £29 per ton; powdered, £30 per ton.

CALCIUM CHLORIDE.—English make, £6 5s. per ton, ex quay or station. Continental slightly cheaper.

COPPER SULPHATE.—Price about £27 per ton, ex quay.

COPPERAS, GREEN.—Quoted £3 15s. per ton, ex works.

FORMALDEHYDE, 40%.—Offered at £66 per ton, ex works.

GLAUBER SALTS.—Fine white quality, £5 per ton; large crystals, £4 per ton. In little request.

LEAD.—Red, £39 per ton, delivered; white, £51 10s. per ton, delivered. Moderate demand for red lead.

MAGNESITE, GROUND CALCINED.—Finest Greek, about £12 per ton; synthetic, £9 per ton.

MAGNESIUM CHLORIDE.—Quoted £6 15s., spot delivery. On offer at £5 10s., c.i.f. prompt.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality, £7 5s. per ton; B.P., £9 10s. per ton.

POTASSIUM BICHROMATE.—Price, 6¼d. per lb., delivered.

POTASSIUM CARBONATE, 90/92%.—Quoted £31 per ton, ex store. Continental offers of £28 15s. per ton, c.i.f. U.K.

POTASSIUM CAUSTIC, 88/92%.—Quoted £31 per ton, ex store. Continental offers of £28 15s. per ton, c.i.f. U.K.

POTASSIUM NITRATE (SALTPETRE).—Price about £33 per ton, spot delivery.

POTASSIUM SULPHATE 90%.—Quoted £14 to £15 per ton.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; mineral water quality, £1 per ton less.

SODIUM BICHROMATE.—Price, 5d. per lb. delivered.

SODIUM BISULPHATE (NITRE CAKE).—Supplies are offered at 16s. 8d. per ton, ex makers' works.

SODIUM CARBONATE (SODA CRYSTALS).—£5 15s. per ton, ex quay or station.

SODIUM CAUSTIC.—76/77%, £23 5s.; 70/72%, £21 5s.; 60% broken, £24; 98/99%, powdered, £26 15s. to £27 15s. per ton, ex station.

SODIUM HYPOSULPHITE.—Commercial crystals, £13 to £14 per ton; pea crystals, £18 10s. to £19 10s. ex station.

SODIUM NITRATE.—Price remains £14 per ton, 5s. extra for refined quality.

SODIUM SILICATE, 140°.—Continental make offered at £10 10s. c.i.f. U.K.

SODIUM SULPHATE (SALTCAKE 95%).—Moderate export inquiry. Some available at £4 per ton f.o.b.

SODIUM SULPHIDE, 60/62%.—Continental make on offer at £15 10s. per ton c.i.f. U.K.

SODIUM PRUSSIATE, YELLOW.—Spot lots on offer at 11d. per lb.

SULPHUR.—Surplus Government stocks of Sicilian Thirds still available at £4 5s. to £4 15s. per ton; flowers, £14 per ton; roll, £13 per ton; rock, £12 per ton; ground, £12 per ton.

WAX, AMERICAN TEST, 122/124° (WHITE PARAFFIN SCALE).—Offered at 1⅝d. per lb. c.i.f.

ZINC CHLORIDE.—Quoted £20 per ton c.i.f. U.K., prompt.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ANILINE OIL.—English makers' price still remains firm at 1s. per lb.

ANILINE SALT.—Price firm at 1s. 1d. per lb.

"H" ACID.—Export inquiry. Price quoted, 6s. 6d. per lb. 100% basis, f.o.b.

METAPHENYLENEDIAMINE.—Export inquiry. Price quoted, 6s. per lb. f.o.b., casks included.

NITROSOPHENOL.—Home inquiry. Price quoted, 3s. 4½d. per lb. delivered.

PARA AMIDO DIPHENYLAMINE.—Export inquiry. Offered at 7s. per lb., f.o.b.

Aniline Dye Trade of China

A REPORT on the foreign trade of China, published in the *Board of Trade Journal*, states that the trade in aniline dyes and artificial indigo during 1921 was influenced by the same adverse circumstances that hampered the import trade in general, such as falling exchange, heavy stocks, and weak markets. The outstanding feature of the year was the drastic and continuous fall in market prices. Throughout the whole period of the war and for a considerable time after the Armistice the supply of dye-stuffs in China did not meet the demand. This, coupled with the then favourable exchange, resulted in selling prices remunerative alike to the foreign importers and Chinese dealers. The situation was completely reversed during the year under review, when a falling off in the demand and the re-entry of Germany as a factor into the world's markets resulted in keen competition for the China trade and a sensational drop in prices, which at the close of 1921 were not more than half of the prices ruling in the previous year. In spite of these unfavourable circumstances, the importation of aniline dyes in 1921 rose from 7.7 million to 8 million taels, while artificial indigo shows a slight decrease in value, from 15.3 million to 15.2 million taels, as compared with the preceding year. Quantities imported were also slightly greater in the case of both commodities. Of the indigo imported, 3,535,600 taels worth arrived from France and 2,617,177 taels worth came from the United States. Of the remainder, 1,934,448 taels must be credited to Great Britain, 1,857,124 taels to Germany, and 1,289,373 taels to Switzerland. As regards aniline dyes, the principal countries of origin of the amounts imported into China in 1921 were:—Germany, 3,390,278 taels; Hong Kong, 1,398,186 taels; the Netherlands, 1,041,198 taels; Belgium, 750,128 taels; and Japan 699,936 taels.

German Chemical Trade Notes

FROM OUR OWN CORRESPONDENT.

Berlin, August 7, 1922.

ACCORDING to the Report of the Prussian Chamber of Commerce on trade conditions during June and July, published in the *Frankfurter Zeitung*, the manufacture of dyes and pharmaceutical products continued satisfactory. Sales of dye materials in the home market, which had been relatively considerable in June, fell off a good deal in July in consequence of a great rise in prices. Foreign buyers, too, seem to have held back with orders lately. Foreign business suffers much under the Customs duties imposed by the former enemy State and also by neutral States—for instance, Spain. In Czecho-Slovakia strong Swiss competition is observable. In overseas markets also, notably in the Far East, the German dye and colour industry is meeting with vigorous competition everywhere, particularly from the Swiss and American colour works. In British India the German prices have been underbid in some instances by English firms, and also in Dutch India.

Owing to the present unsettled position on the German chemical market it is exceedingly difficult to arrive at a quotable figure for the majority of products, as holders have surprisingly wide and varied ideas as to prices.

The following quotations, which are given in marks per kilogram (d. = domestic price; e. = export price) must therefore be taken as approximate:

ACIDS: Acetic, 80%, 62 mk. d. Boric, 145/150 mk. d. Citric, loose, 480 mk. d.; 500 mk. e. Formic, 85%, 38 mk. d. Oxalic, 98/100%, 48 mk. d.; 100/140 mk. e. Salicylic, 200 mk. d. Tartaric, 325 mk. d.; 360 mk. e.

INDUSTRIAL CHEMICALS: Alum, potash crystal powder, 12/13 mk. d.; 16 mk. e.; lumps, 16 mk. d.; 22/23.50 mk. e. Alumina sulphate, 17/18%, 16 mk. e. Ammonia carbonate, ground, 24 mk. d.; 47 mk. e. Barium carbonate, 22 mk. d. Barium chloride, 26 mk. d.; 38 mk. e. Bleaching powder, 9.50 mk. d.; 16.50 mk. e. Borax, 72/74 mk. d. Calcium chloride, 8 mk. d.; 9.50 mk. e. Chrome alum, 15%, 43/50 mk. d.; 58/64 mk. e. Copperas, 7/7.50 mk. d.; 9 mk. e. Copper sulphate, 98/100%, 56/59 mk. d.; 63 mk. e. Epsom salt, crystallised, 4.75 mk. d.; 6.75 mk. e. Formaldehyde, 40%; 115 mk. d.; 125 mk. e. Glauber's salt, crystallised, 2.90/3 mk. d.; 525 mk. e. Glycerine, double distilled, 28° Bé, 125 mk. d.; 160 mk. e. Iron nitrate, 40° Bé, recently quoted at 6 mk. d. Litharge, 66 mk. d.; 80 mk. e. Lithopone, red seal, 28/30 mk. d. Magnesium chloride, fused, 3.75 mk. d.; 8.50 mk. e. Naphthalene, 25 mk. d.; 32 mk. e. (balls), and 24 mk. d.; 30 mk. e. (flakes). Potash bichromate, 83/85 mk. d.; 115 mk. e. Potash carbonate, 96/98%, 37.50 mk. d.; 61.50 mk. e. Potash caustic, 34/37 mk. d.; 61 mk. e.; liquor, 16.15 mk. d. Potash chlorate, 39/43 mk. d.; 51/52 mk. e. Potash metabi-sulphate, 65 mk. d. Potash permanganate, 110 mk. d.; 130 mk. e. Potash prussiate, yellow, 285/300 mk. d.; red, 700 mk. d. Potash saltpetre, 35 mk. d. Sal ammoniac, white crystallised, 38/44 mk. d.; 52/56 mk. e. Salk cake, 7.50 mk. d.; 8 mk. e. Soda ash, 98/99%, 16.50/17 mk. d.; 16 mk. e. Soda bicarbonate, 12/15 mk. d.; 23 mk. e. Soda caustic, 125/128°, 37/38 mk. d.; 39 mk. e.; liquor, 13.50/14 mk. d. Soda crystals, 11 mk. d. Soda hyposulphite, pea form, 16/19.50 mk. d.; 21/23 mk. e.; crystallised, 13/17 mk. d.; 19 mk. e. Soda saltpetre, technical, 22 mk. d. Soda silicate 38/40°, 4.75 mk. d.; 7 mk. e. Soda sulphide, 30/32°, 22 mk. d.; 13 mk. e.; 60/62%, 24/25 mk. d.; 30 mk. e. Sugar of lead, refined crystallised, 65/75 mk. d.; 81/85 mk. e. Zinc chloride, 27.50 mk. d.; 35 mk. e. Zinc sulphate, 23 mk. e. Zinc white, red seal, 60/66 mk. d.; 72/75 mk. e.; green seal, 76 mk. e.

Iron and Steel Institute

THE following are the papers arranged to be read at the autumn meeting of the Iron and Steel Institute, which will be held at York on September 5 to 8:—"The Changes of Volume of Steels during Heat Treatment: Air-hardening Nickel-Chromium Steels," by Mr. L. Aitchison; "Nitrogenisation of Iron and Steel by Sodium Nitrate," by Mr. L. E. Benson; "A Brinell Machine Attachment for Use with Small Specimens," by Mr. E. D. Campbell; "A Preliminary Magnetic Study of Some Heat-treated Steels," by Messrs Campbell and Johnson; "Some Experiments on the Flow of Steels at a Low Red Heat, with a Note on the Scaling of Heated Steels," by Mr. J. H. S. Dickenson; "An Investigation on the Factors Influencing the Grain and Bond in Moulding Sands," by Mr. C. W. H. Holmes; "Practical Notes on the Manufacture and Treatment of High-speed Steel," by Mr. H. K. Ogilvie; "The Bases of Modern Blast-furnace Practice," by Mr. A. K. Reese; "Reversing Cogging Mills: Their Drives and Auxiliary Equipment," by Mr. G. A. V. Russell; and "The Diminution of Lag at Arl through Deformation," by Mr. J. H. Whiteley.

Manchester Chemical Market

Monthly Report by Sir S. W. Royse and Co., Ltd.

DURING last month the home demand fell away somewhat, influenced, no doubt, by the holiday season, but prices on the whole have remained steady. The reduction of 25 per cent. of the increase in rates of railway carriage came into force on August 1 and should assist business. The export inquiry has been only moderate, and the erratic courses of exchange continue to hinder oversea trade generally.

Sulphate of copper has been in regular request for both home and export account, but there is little change in values. Green copperas has been in better demand but competition continues keen. Acetates of lime have been quiet, and prices have a lower tendency. Acetic acid has been freely offered from recent arrivals at low prices. Acetate of soda is in short supply, with values well maintained. Acetates of lead and nitrate of lead are firmer with the advance in the metal, which has also affected the values of litharge and red lead. Carbonate of potash has an improved inquiry and prices are well maintained. Caustic potash is in only moderate request. There is nothing doing in Montreal potashes. Yellow prussiate of potash is in short supply and again dearer; soda is more plentiful but firmly held. White powdered arsenic has been moving freely, but values are unchanged.

There has latterly been a little falling away in the demand for tartaric acid and cream of tartar, and holders of stocks have been realising at lower prices, but the raw material position is very firm. Makers of citric acid are well booked ahead. American bichromates are still offered freely and British makers have reduced their prices, but the consuming demand is only moderate. Chlorates of potash and soda have been in only limited request. There is no change to record in borax and boracic acid. Phosphate of soda is quiet. Continental supplies of alum and sulphate of alumina are still offered at low rates, but makers here have been meeting the position. Oxalic acid is scarce, but values are unchanged. A steady export inquiry has been ruling for muriate of ammonia and salammoniac. The price of ammonia alkali for the home trade has been again reduced, and there is a fair inquiry. White caustic soda continues in good demand for the home trade, and experts are also better.

There is little new to report in the tar products market, but it is interesting to note that several large coke ovens have actually restarted and that others contemplate working at an early date. Benzol and toluol remain in poor demand. More solvent naphtha is offering at the moment, but consumers are well covered and new business is scarce and competed for. Creosote oil remains unchanged, but with the bulk of the season's requirements in dehydrated tar covered, larger supplies are anticipated. Very little is doing in carbolic acid. Naphthalenes are again easier, with no demand. There is little change in the position of pitch for next season's delivery. There has been a certain amount of Continental business, which has been readily taken up, but, in general, foreign consumers, by reason of their position, are not disposed to pay prices now being indicated. In South Wales, consumers appear well covered and deliveries are no longer being pressed forward, the demand for briquettes having fallen off. The anticipation in some quarters of a considerable advance resulting from the American coal strike has not so far been realised. Sulphate of ammonia remains unchanged.

The demand for farina is only small, but some good business is reported in new crop for October shipment; dextrine is quiet. A good trade has been doing in barytes at the lower prices ruling. American turpentine has fallen steadily, and trade has been only in small lots. Paraffin wax and scale are quiet.

Permissible Explosives Specifications Approved

THE specifications for the testing and use of permissible explosives, as prepared and sponsored by the United States Bureau of Mines, have been approved as American Standard (A.E.S.C. No. 23) by the American Engineering Standards Committee, under date of July 11. The Bureau of Mines has formally accepted continued sponsorship for this standard in order that revisions may be automatically taken care of through the regular American Engineering Standards Committee procedure.

Company News

BRITISH COTTON SEED PRODUCTS, LTD.—At an extraordinary general meeting held on August 3, the resolution which was passed at an extraordinary meeting held on July 18 was duly confirmed.

J. and J. CUNNINGHAM, LTD.—Including the balance brought in, the amount at the credit and profit and loss for the year to June 30 is £41,236. A dividend is announced at the rate of 5 per cent. per annum, tax free, on the ordinary shares, leaving to be carried forward £21,236.

ANTOFAGASTA NITRATE CO.—The Law Debenture Corporation, Ltd., have extended until to-day (Saturday) the last day for the receipt by them of letters of renunciation in respect of the Antofagasta Nitrate 6½ per cent. first mortgage debentures. After to-day no effect can be given to any renunciation.

JOHN BELL AND CROYDEN, LTD.—The report for the period to April 30 last shows a net profit of £37,658. The directors recommend a dividend of 10 per cent. on the preference shares, and a dividend of 6d. per share on the ordinary, both less tax, carrying forward the balance. The volume of business transacted during the period under review is on the increase, notwithstanding the restricted spending power of the public, due to heavy taxation, and to decrease in prices generally. The annual meeting will be held at 52, Wigmore Street, London, on August 18, at noon.

FORSTER'S GLASS CO.—The report for the year to March 31 last states that a loss of £52,623 was made. The balance of carry forward from last year, after providing for excess profits duty and corporation profits tax, final ordinary dividend for year to March 31, 1921, and interim dividend on cumulative participating preference shares, paid on September 30, 1921, amounted to £21,044, which, set against the adverse balance, leaves a net deficit of £31,579, exclusive of any depreciation. Stocks have been written down to a low figure, and this has resulted in a loss of at least £20,000. The directors do not anticipate that any further writing down will be necessary during the current year. When the directors consider the time opportune preference shareholders will be called together on the question of raising additional capital for purpose of paying off the bank overdraft of £102,574 and providing working capital.

BENN BROTHERS, LTD.—The report for the year ended June 30 last refers to the heavy loss sustained by the company owing to the death of its founder and chairman, Sir John Williams Benn. The directors have the pleasure to present a profit and loss account and balance sheet which again show a marked advance in both the volume and the realised results of the business. The capital account again shows a small increase due as before to the continuing desire on the part of members of the staff to become shareholders in the business. Almost without exception the numerous publications owned by the company show a satisfactory advance and are in a stronger position than a year ago. In every case expenses have increased by reason of the considerable additions which have been made to all subscription lists, and in almost every case revenues have advanced to meet these expenses. The steady upward movement of all the circulations is the best evidence of the quality of the journals published by the company and the service which they are rendering to the industries they represent. The Technical Books Department has more than justified the hopes expressed with regard to it in last year's report. Several authoritative works on technical and art subjects have been added during the year to the firm's already important list of publications. These productions have received the most favourable reviews and in at least one case have gone to a heavy premium. The directors are now actively engaged in the promotion of a new European trade journal, to be published in Vienna, and to be called *The European Commercial*. The first issue is due to appear on September 9. This enterprise has received a welcome bordering upon enthusiasm from most of the governments of Europe and trading and commercial authorities the world over. The outstanding questions with regard to taxation having been settled, the directors feel able to make a larger appropriation to General Reserve. The profit for the year is the largest on record, and, as shown by the accounts, amounts to £38,219, which with £8,453 brought forward makes an available total of £46,672, a figure which justifies a slight increase in the rate of dividend. Directors' percentages will absorb £11,332, and £4,000 is added to General Reserve, making it £12,250. Payment of a dividend of 17½ per cent. for the year (against 15 per cent.) on the ordinary shares absorbs £19,922 13s. 8d., leaving £11,417 7s. 5d. to be carried forward. The twenty-sixth annual meeting was held yesterday (Friday) at 8, Bouverie Street, London.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. NO.
Montreal.....	Druggists' proprietary goods	121
Marseilles	Chemicals, tallow and oils	125
Sydney	Perfumes	133
Rotterdam ...	Chile saltpetre	D.O.T. 15665/ F.W./C.P.
Egypt	Tierol (for denaturing ethyl alcohol)	D.O.T. 8759/F.E.
Switzerland ..	Raw materials for chemical products	151
Basle	Pharmaceutical chemicals	152

Tariff Changes

HUNGARY.—Changes have been made in the rates of Customs duties. Particulars are obtainable from the Tariff Section, Department of Overseas Trade, 35, Old Queen Street, London.

LITHUANIA.—A copy of the new Customs Tariff, which came into force on June 30, may be consulted at the Tariff Section of the Department of Overseas Trade.

UNITED STATES OF AMERICA.—Further Senate amendments of the Tariff Revision Bill affecting chemicals, scientific instruments, etc., were published in the *Board of Trade Journal* (July 27, p. 111).

TANGANYIKA TERRITORY.—The prohibition on the importation of dyestuffs has been removed.

GREECE.—Modifications in the Customs Tariff affect import duties on a number of chemicals and dyes. Details of the changes were published in the Board of Trade *Journal* of August 3, p. 139.

CUBA.—Particulars as to the rates of duty proposed under a proposed new tariff are obtainable from the Tariff Section of the Department of Overseas Trade, 35, Old Queen Street, London.

Government Contracts

THE following were among the Government Contracts placed during June:—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).—*Oil, Lubricating, Heavy Filtered Material:* Anglo-American Oil Co., Ltd.; London Lubricants (1920), Ltd. *Soap, Hard:* Ferguson, Shaw and Sons; Edward Cook and Co., Ltd.; Wilkie and Soames, Ltd.; Ogston and Tennant, Ltd. *Soap, Soft Substitute:* Ferguson, Shaw and Sons; Palmer and Co., Ltd. (CIVIL ENGINEER-IN-CHIEF'S DEPARTMENT). *Portland Cement:* The Cement Marketing Co., Ltd.

WAR OFFICE.—*Portland Cement:* Ship Canal Portland Cement Manufacturers, Ltd. *White Spirit:* Meade-King, Robinson and Co., Ltd.

AIR MINISTRY.—*Portland Cement:* Cement Marketing Co., Ltd.

CROWN AGENTS FOR THE COLONIES.—*Drugs, etc.:* Burgoyne, Burbidges, and Co., Ltd.; Howards and Sons, Ltd. *Neovarsensobillon:* May and Baker. *Neosalvarsan:* A. C. Henry.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

ANDERSON AND WHITELAW, 11 and 12, Broad Street Corner, Birmingham, chemists. £13 16s. 8d. May 22.

BLUNT, W. H., AND SON, 70, Snow Hill, Birmingham, chemists and druggists. £16 6s., June 20, and £11 8s. 9d., June 21.

CINEMA SOAP CO., LTD., 7, Gillespie Road, Blackstock Road, N., manufacturers of toilet preparations. £21 12s. 10d. June 12.

FLOWERS, George (and wife), 4 West View, Tinsdall Crescent, Bishop Auckland, by-product worker. £14 16s. 2d. June 21.

LLEWELLYN, W., Dunraven Street, Tonypandy, chemist. £14. June 21.

McGREGOR, J., 12, Market Street, Morecambe, chemist. £17 6s. 4d. June 10.

MOORE, Thos., 84, Chapel Street, Stockport, soapmaker. £12 3s. June 16.

PENRHIWCEIBER CO-OPERATIVE SOCIETY, LTD., Rheola, Penrhiwceiber, chemists.. £20 9s. 7d. June 12.

PYE, Harry, Spalding, pharmacist. £22 17s. 6d. June 7.

STARKEY, —, 31, Field Street, Springfields, Wolverhampton, chemist. £14 8s. 4d. June 19.

WALTON, William, 14, Cross Street, Stratford, chemist. £10 9s. 7d. May 30.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BEDE METAL AND CHEMICAL CO., LTD., Hebburn-on-Tyne.—Registered July 26, £15,000 debentures, balance of £50,000; general charge. *Nil. April 19, 1922.

BLEACHERS' ASSOCIATION, LTD., Manchester.—Registered July 22, conveyance being an assurance by way of substituted security (supplemental to Trust Deed dated November 21, 1901, securing £2,250,000 debenture stock); charged on lands, farm buildings, etc., at Bradshaw. *£2,250,000, £75,000, £56,000, £90,000, £50,000, £65,000, £50,000. July 5, 1921.

MARLEY HILL CHEMICAL CO., LTD., London, E.C.—Registered July 27, £1,000 debentures part of £100,000; general charge. *£49,000. February 21, 1922.

POWELL (JAMES) AND SONS (WHITEFRIARS) LTD., London, E.C., glass manufacturers. Registered July 25, £80,000 first debentures and £25,000 second debentures; general charge. *£55,000. June 29, 1921.

RAIMES AND CO., LTD., Stockton-on-Tees, manufacturing chemists, etc.—Registered July 26 (by order on terms), charge (supplemental to Trust Deed dated July 1, 1901), securing increased rate of interest and modifying the conditions of redemption; charged on property, charged by Trust Deed. *£14,800. May 5, 1922.

Satisfactions

BEATSON, CLARK AND CO., LTD., Rotherham, glass manufacturers.—Satisfaction registered July 28, £8,000, registered February 10, 1921.

GILBERT AND KNOWLES, LTD., London, E.C., chemical merchants.—Satisfaction registered July 26, £300, part of amount registered September 1, 1921.

Receivership

RICHMOND GLASS WORKS, LTD.—J. Green, of 79, Mark Lane, E.C., ceased to act as receiver and manager on July 24, 1922.

London Gazette

Company Winding up Voluntarily

O. H. N. GASES, LTD.—Meeting of creditors at Midland Bank Chambers, Bridge Street, Walsall, on Wednesday, August 16, 1922, at 11 a.m.

Partnerships Dissolved

CORNWELL, Thomas Chinsura, and SHAW, Henry Clement, chemists, 14, Piccadilly, Hanley, under the style of T. C. CORNWELL, by mutual consent as from December 31, 1921. Debts received and paid by H. C. Shaw.

LOW, Henry Vales, and LOW, Charles Abbott, chemical and india rubber merchants, Broad Street House, New Broad Street, E.C., formerly at 3, London Wall Buildings, London Wall, under the style of G. F. BERRY AND CO., by mutual consent, H. V. Low retiring as from August 1, 1922. Debts received and paid by C. A. Low, who is continuing the business under the present style.

SANGUINETTI, Frank, and HARDING, Charles Thomas, chemists, 120, Uxbridge Road, and 4, Castle Hill Parade, Ealing, under the style of SANGUINETTI AND HARDING, by mutual consent, as from July 1, 1922. Debts received or paid by C. T. Harding, who will continue the business.

New Companies Registered

DEMPSTER (WILLIAM) AND SON, LTD., 17, Cooper Street, Manchester. Chemical manufacturers, etc. Nominal capital, £4,000 in £1 shares.

JERVIS CO. (Incorporated in U.S.A.), 29, Great Pulteney Street, London. Capital, 1,000 shares of no nominal or par value. Oil, chemicals, fish oil and guano merchants, manufacturers of fertilisers, etc.

PELSANA, LTD., manufacturing chemists, perfumers, soap manufacturers, etc. Nominal capital, £2,000 in £1 shares. A director: W. Kirkby, 25, Thornfield Road, Stockport.

PILKINGTON BROTHERS (BRAZIL), LTD., manufacturers of and dealers in glass, white lead, paints, oils, varnishes, colours, chemicals, etc. Nominal capital, £50,000 in £10 shares. A director: R. A. Pilkington, Eccleston Grange, St. Helens.

SMART'S TAR DISTILLERY, LTD., Eagle Chemical Works, Barchester Street, Poplar, London. Distillers of tar-shale, resin, pitch, oil and coal, manufacturers of patent fuel, creosote, naphtha, dyes, disinfectants, etc. Nominal capital, £10,000 in £1 shares.

SUPER-CLEANSER, LTD., 5, Wine Office Court, Fleet Street, London. Manufacturers of cleansers and disinfectants, and manufacturers of and dealers in wood, stone and metal preservatives, etc. Nominal capital, £1,000 in 950 shares of £1 each and 1,000 shares of 1s. each.

THRIVO FERTILIZERS, LTD., 60, Norwood Avenue, Stockport. To take over the business carried on at the above address as "Thrivo." Nominal capital, £2,000 in £1 shares.

WASTE RECOVERY SYNDICATE, LTD., 729–730, Salisbury House, London, E.C. To carry on research work and the development of inventions relating to the treatment of waste fuel residues, chemical engineers, etc. Nominal capital, £10,000 in £1 shares.